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ABSTRACT

The bibliographic citations and annotations in this publication are drawn from the "International Bibliography on World Trends in Environmental Education" compiled for the UNESCO-UNEP Environmental Education Programme. The original publication was designed to serve as a bibliography for the authors of a series of working documents on environmental education prepared for the International Workshop on Environmental Education held in Belgrade in October 1975. The first part of this publication contains the selected items arranged by the 14 themes of the workshop; under each heading a number of publications pertaining to that subject area are given with a cross reference to the main bibliography. In the second part, the complete bibliographic information and annotation can be found listed alphabetically by author. A separate author's index is not included in this issue. (Author/BT)

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Educational documentation and information

Bulletin of the International Bureau of Education

World trends in environmental education

Prepared for the
International Bureau of Education

by J. David Lockard,
Director, International
Clearinghouse on Science,
and Mathematics
Curricular Developments

in collaboration with
Jack Wheatley and Emmett Wright

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P R E F A C E

The bibliographic citations and annotations in this publication are drawn for the most part from the *International bibliography on world trends in environmental education* compiled for the Unesco-UNEP Environmental Education Programme. The original publication was designed to serve as a bibliography for the authors of a series of working documents on environmental education prepared for the International Workshop on Environmental Education held in Belgrade in October 1975. Consequently, the first part of this publication contains the selected items arranged by the fourteen themes of the workshop; under each heading a number of publications pertaining to that subject area are given with a cross-reference to the main bibliography. In the second part the complete bibliographic information and annotation can be found listed alphabetically by author. Since the main part of the bibliography is in alphabetical order, it was not considered necessary to produce a separate authors index for this issue.

The Secretariat of the International Bureau of Education thanks the authors of the original publication, J. David Lockard, Director of the International Clearinghouse on Science and Mathematics Curricular Developments, University of Maryland, College Park, Maryland (United States of America), and Jack Wheatley and Emmett Wright of the Science Teaching Center, University of Maryland, and emphasizes its gratitude to Dr Lockard who has made the selection for this issue of the Bulletin.

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WORLD TRENDS IN ENVIRONMENTAL EDUCATION

INTRODUCTION TO THE SELECT BIBLIOGRAPHY

With the increasing interest in how best to teach the world's citizens about their environment, there has been a growing realization that it would be quite valuable to have a document that gave a global overview of the various publications appearing on environmental education. There had been surveys done earlier on nationwide and regional bases, but little effort had been made at bringing all these together on a worldwide basis.

It was in 1974 that the Unesco-UNEP Environmental Education Programme requested the compilers of this bibliography to carry out an extensive literature search on all items relevant to environmental education as they related to a number of important specific topics. Topics were selected on the basis of providing an overview of environmental education within both formal and non-formal education and were to serve as working documents for the International Environmental Education Workshop.

The Workshop, held in Yugoslavia, 13-22 October 1975, was called the Belgrade Workshop and is now a landmark meeting for international 'groundbreaking' in this field. One of the most important products of those busy days was 'The Belgrade Charter: a global framework for environmental education', which was adopted unanimously at the close of the ten-day period. Subject to the evolution of inevitable change and improvement, the Belgrade Charter has laid down the principles and established the guidelines for the worldwide environmental education of a generation which spans the earth. This document came forth as a form of unanimity among the ninety-six participants and observers from some sixty countries. They represented all levels of formal and non-formal education—primary, secondary and higher, youth and adult—as well as major international organizations concerned with environmental education—both governmental and non-governmental.

The principal aims of the Belgrade Workshop were: (a) to review and discuss the trends and emerging issues in environmental education; and (b) to formulate, on this basis, guidelines and recommendations for furthering environmental education internationally. Activities of this ten-day working conference revolved around its working groups, in which all participants were involved on a cross-cultural, multi-national basis. A set of trend papers, whose topics are described below, served as a background for discussions. The trend papers served, along with Unesco-UNEP Reports on Consultants' Missions and a Preliminary World Survey of Environmental Education Needs and Priorities, as working documents.

Since the select bibliography that makes up this issue of the *Bulletin* was taken from the much more extensive bibliography that was prepared for the trend paper authors, more detail on those trend papers is included here. They were developed to describe the state-of-the-art in environmental education in all parts of the world, covering many of its aspects and all of its age levels. Authors came from fourteen countries: Argentina, Canada, Czechoslovakia, Egypt, Italy, Japan, Netherlands, Sierra Leone, Sri Lanka, Sweden, United Kingdom, United States of America, Venezuela and Yugoslavia.

Each of the trend papers was to provide: (a) an objective review of developments and trends in environmental education; (b) an identification and analysis of some of the major issues and problems that confront the field; (c) suggestions for future action to help resolve the issues identified; and (d) a selected literature review and annotated bibliography to guide the reader into the world literature pertaining to the topic covered by each manuscript. The select bibliography that follows was developed around each of the fourteen topics of the trend papers and in the original working document was separated out for the convenience of each author. The trend papers themselves will be published by Unesco in French, English and Spanish in spring 1977.

The topics of the trend papers and some general comments on the material they attempted to cover are as follows:

1. The philosophy, goals and objectives of environmental education

The emerging philosophy, ethics, goals and objectives of environmental education in a world context; an overview of the changing socio-political-economic-environmental climates of the world with particular emphasis on the events of the past ten to fifteen years; the rationale for environmental education in terms of the relationships between man and the biosphere; the historic relationships between environmental education, nature education, outdoor education and conservation education; the ways in which goals and objectives are translated into environmental practice and materials; identification of unresolved issues and possible future directions.

2. Methodologies of environmental education

Information about and examples of various methodologies utilized in the teaching of environmental education at the different levels of formal education and in non-formal education; models covered include teachers conveying a predetermined body of knowledge, independent study, programmed learning, team teaching, the teacher as guide and facilitator; the relationship between conventional methods of instruction in the different national systems and those identified as especially appropriate to the nature of environmental studies; issues relating to the conditions suitable for multi-, inter- and transdisciplinary studies; the use of education technology and issues related to the infusion of environmental topics as contrasted to the use of specially designed courses.

3. Learning environments for environmental education

Issues relating to the settings in which environmental education takes place with special attention to this aspect of teacher education programmes; the use and value of environmental study areas in various parts of the world; opportunities for environmental studies in urban settings; the impact of the classroom environment on the learning situation and the educational impact of the use of technology in learning about the environment; issues relating to the perception of environmental quality.

4. Instructional resources for environmental education

The nature and availability of instructional resources (standard texts, supplementary materials, audio-visual materials, kits, role-playing games, simulation models, etc.) and the need for such resources in the various regions of the world; the identification of the major

factors that inhibit the distribution and use of these resources in different parts of the world; discussion of the credibility of materials based on the source (industry, government or private sponsorship); considerations on the nature of the materials presently available with some projection of the type of materials that need to be developed; the impact of educational technology in furthering the goals and objectives of environmental education.

5. Pre-school and primary school environmental education

Identification and analysis of environmental education programmes from throughout the world; the processes used to establish and sustain the programme and the conceptual design, structure and methods of evaluation used; goals and objectives, methodologies and learning environments, and descriptions of the instructional resources used in the programmes; discussion of course content and subject matter along with the extent to which interdisciplinary activities occur; identification, when possible, of the procedures used in establishing programmes, the financial and technical support that was needed and the processes of innovation and programme adoption with reference to teacher education efforts.

6. Environmental education in secondary schools

Identification and analysis of school programmes from various areas of the world; issues dealing with course content, the 'place' of environmental studies in the secondary school curriculum and the questions of whether environmental issues should be infused into existing subjects or organized as a separate 'subject'; consideration of the relevance of interdisciplinary programmes of study; discussion of the need for teacher preparation; processes used to establish the programme, the conceptual design, objectives, and methods of evaluation with specific examples; discussion of whether primary or secondary school levels should be given higher priority in the establishment of national environmental education programmes.

7. Environmental education at the tertiary level for general students

Review of trends and developments regarding the environmental studies for general students at higher education levels; identification of the goals and objectives, methodologies, materials and resources utilized, and the procedures for evaluating students and programmes; examination of the distinctions between multi-, inter- and transdisciplinary studies and the extent to which the social sciences and humanities are included; consideration of various organizational and administrative forms; faculty and student relationships; possibilities of work-study and student-directed research projects; the aspects of the environment that have the greatest need for manpower; inter-institutional relations and communications.

8. Pre-service and continuing education for teachers

Current trends in environmental education for teachers in various areas of the world; the types of pre-service experiences teachers at primary and secondary levels are exposed to; the approaches being utilized in the continuing education of teachers; relevant characteristics of environmental education teacher preparation programmes in different parts of the world and to what extent they emphasize process or content; the ways inter-, multi- and transdisciplinary studies are included; to what extent and in what manner can teacher education programmes in one region of the world serve as idea models for other regions of the world?

9. Environmental education for specialists in non-environmental fields

Examples of training programmes which provide environmental background for specialists in fields which are not essentially environmental but the practice of which has considerable impact on the man-made and natural environments (i.e. engineers, lawyers, bankers, etc.); programmes which are part of advanced degree studies and professional in-service seminars

and workshops; efforts to provide continuing education for these specialists; activities of professional societies, individual companies and governments with particular emphasis on those with international overtones; the role of professional journals.

10. Out-of-school programmes for and by youth

Summaries of exemplary environmental education activities for and by youth in various parts of the world; information on innovative approaches for involving and educating youth in environmental matters; major problems and constraints that young people encounter in working towards solutions of environmental problems; the kinds of environmental education activities that youth are most involved in; the present and potential efforts of youth organizations in building coalitions; communication and co-operation with organizations which are not primarily youth oriented; the overlap between youth and adult programmes; estimates of the number of youth active in organizations in different regions of the world; and the problems and opportunities of working with youth.

11. Environmental education programmes for adults

Data on environmental education programmes for adults in different regions of the world; conventional and innovative approaches to adult education; identification of the goals and objectives, methodologies, materials and resources used, settings in which the programmes take place and the methods used for determining the achievements and success of the programmes; the role and impact of the efforts of industry, labour and government groups; the use and effects of mass media; the major constraints encountered in working towards the resolution of environmental problems; the present and possible efforts aimed at developing national and international coalitions; the identification of adult organizations in different regions of the world and the composition of their membership.

12. The evaluation of environmental education materials and learning

Examination of evaluation procedures and instruments at primary, secondary and tertiary levels of education currently in use for assessing student achievement; questions regarding the evaluation and grading of process-oriented learning and field studies; the successes and shortcomings of instruments and techniques in use, especially in terms of academic achievement and attitude change; efforts to assess values classification and the change of attitude with regard to environmental issues; questions relating to the evaluation of environmental materials during the process of development and as a matter of adoption for classroom use; relationships of these to establishment of goals and objectives for materials and programmes.

13. National policies, legislation and funding relating to environmental education

Analysis of the role of legislation and national policies in the establishment and expansion of environmental education; the impact of legislation on teacher certification; the methods in which national policies and priorities are established in support of teacher education and materials development with respect to environmental education; major sources of financial support in different regions of the world including governmental, industrial and foundation sources; the extent to which the implementation and expansion of environmental education is dependent on funding designated for that purpose; where does, could and should the financial burden of environmental education rest?

14. International and regional co-operation

Benefits and limitations of international and regional co-operation in the implementation of national programmes; the roles played by various inter-governmental and non-governmental organizations in the development, enrichment and implementation of environmental education programmes; identification of international organizations and examples of relevant programmes; specific ways in which co-operation at these levels has and can contribute to the implementation of national programmes; the role of international meetings and publications as an aid in establishing and strengthening environmental education activities.

Knowing the particular topics and the related material around which the bibliography on environmental education was developed should help the user to select the references most closely related to his or her interests. Each section in the bibliography is tied directly to one of the fourteen topics described above.

DEVELOPMENT OF THE BIBLIOGRAPHY

Immediately following the request by the Unesco-UNEP Environmental Education Programme staff in Paris, work began on the worldwide literature survey by sending out request letters to all parts of the world. They went out to the normal Unesco and UNEP mailing lists as well as to Unesco related groups. Since this was the first worldwide literature search of this nature, follow-up letters were used to add on the new contacts as they were made. In addition, the trend-paper authors themselves, as well as James Aldrich who served as co-ordinating editor of the trend papers, were of considerable help.

It soon became apparent that a good deal of material had been written on the topics in the English-speaking countries and considerably less in other areas. At this point in time, when deadline dates for getting a 'working' bibliography to the authors were approaching, the services of Robert Howe and Stanley Helgeson of the ERIC Center on Science, Mathematics and Environmental Education at the Ohio State University in Columbus (United States) were added to the work already underway. The Ohio State group concentrated on the publications in English found mainly in Australia, the United Kingdom and the United States, and the abstracts already in the ERIC national network were also used. The International Clearinghouse concentrated principally on the rest of the world and later made the selection for this condensed bibliography.

The result of this worldwide searching was quite imposing. Although done in a very short time, it was relatively complete and served as a very useful source for the authors as they began writing their trend papers. At the present time, the 'working' bibliography is being added to and more recent material included. Following the completion of the trend papers and the Belgrade Workshop, items have been identified and annotated that give a more worldwide balance.

ORGANIZATION OF THE SELECT BIBLIOGRAPHY

As with the complete *International bibliography*, this select bibliography on world trends in environmental education is organized around the original fourteen topics described earlier. So that the user might go directly to the references most closely tied to the subject sought, there is an opening list of each topic with all the references given by author's name and article or book title. Following the topical listings are the complete annotated references arranged alphabetically by author's last name, or by article title where no author is given. To reduce the content sufficiently to fit this publication, a great deal of additional valuable material had to be left out. Furthermore, a direct effort was made to select material from as wide a distribution of countries as possible (which may give a false sense of the quantity of information available from some countries).

CAUTIONS ON COMPLETENESS

As mentioned earlier, this is the first attempt at such a global survey of the world's literature on environmental education and thus there is material still to be identified. The compilers are still receiving letters stating that particular articles are being sent. Even the choice of references for this select bibliography had to be an arbitrary one, as was the limitation of the topics originally chosen for such an all-encompassing field as environmental education. Readers are urged to send additional worthwhile material to the authors so that a truly international bibliography can emerge from co-operative efforts around the globe.

Listing by subject area

This section contains the bibliographic entries listed under fourteen topic headings. The figures in bold refer to the alphabetical bibliography with annotations which follows.

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XIV. INTERNATIONAL AND REGIONAL CO-OPERATION

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1. Abeles, T.P. Environmental education: a community/university approach. *Journal of college science teaching* (Washington, DC), vol. 3, no. 1, October 1973, p. 50-3. (EJ 085 171.)¹

Describes an interdisciplinary environmental programme instigated at the University of Wisconsin. It was designed to utilize the community as a learning resource and to stimulate university/community interaction. The Kewaunee River watershed project involved university and high school students, faculty and the community.

2. Les actions de l'éducation nationale en matière de sensibilisation à l'environnement. *Informations rapides* (Paris, Ministère de l'éducation nationale), no. 35, 1974, p. 1-6.

From this initiative, set in train by the experiences of transplanted classes (lessons held away from the home school), the structure of environmental teaching tends to emerge. Includes suggestions for suitable teaching materials.

3. Activités d'éveil scientifique à l'école élémentaire. II: Première approche des problèmes écologiques. *Recherches pédagogiques* (Paris, Institut national de recherche et de documentation pédagogiques), no. 70, 1974.

Is it possible, is it useful to give ecological training to young children and to awaken in them an early awareness of man's responsibilities with regard to his environment? Can education for personal conduct allow a rational exploitation of natural resources? This article summarizes work carried out in over 100 experimental classes. Ecological training cannot go beyond the level of propaganda all the while it remains as an element of general education, as it is now in the framework of awareness activities. On the other hand, it is inseparable from the mastery of certain scientific skills—methods and knowledge—gained through a class project and graded to the level of a child's development.

4. Aldrich, J.L.; Kormondy, E.J. *Environmental education: academia's response*. Washington, DC, American Institute of Biological Sciences, 1972. 78 p. [Available from the American Institute of Biological Sciences and the Conservation Foundation, 1717 Massachusetts Ave, N.W., Washington, DC 20036.] (ED 070 393.)

This report is an attempt to identify and answer some of the major questions about the role of environmental studies in higher education and, to some extent, the role of higher

1. Code number refers to the ERIC index.

education in environmental studies. To this end, questionnaires were sent to twenty higher education institutions that offered environmental studies programmes. Fifteen of the institutions responded to the following questions: (a) What were the original goals of the environmental studies programme?; (b) To what extent has the programme evolved and in what way has it been modified?; (c) How does the programme or centre relate to the other college or university activities?; (d) To what extent have the administrative or institutional governance issues been a factor in the development of the centre or programme?; (e) What are the particularly difficult problems that the centre has had to deal with?; and (f) What are the priorities for the future and why were they chosen? While every institution must chart its own course, the compilation of these statements provides useful data for existing and planned programmes.

5. *Alternatives for man and environment: revised curriculum.* Miami-Dade Junior College, FL, 1972. 186 p. (ED 071 556.)

A one-year general education course entitled 'Man and environment' has been developed. The basic framework of the course was built on the premise that an interdisciplinary, module-structured course represents one of the better approaches to planning environmental education curricula. Material from the course can be found in ED 056 930. This booklet, however, presents variations and alternatives for the modules. Twenty topical areas are covered: ecological imperatives; value systems—ecological priorities; belief systems; the myths of technology; earth as an energy system; conservation of vital resources; population dynamics; urbanization; the living community; urban environment; water supply, demand and pollution; sound pollution; scenic pollution; wildlife and man; soil and man; intergroup tensions; impact of political systems; impact of economic systems; and media and the environment. Each section offers one to five alternatives outlining an overview of the module, concepts to be developed, student objectives (learning activities) and a list of resource materials. Where appropriate a chart is constructed indicating each concept, strategy for developing it and suitable evaluation criteria. A bibliography is included.

6. The American biological teacher—interdisciplinary environmental education. *The American biology teacher* (Washington, DC), February 1975. [Special issue.]

7. *The American environment: a home study course.* Washington, DC, Soil Conservation Service, 1971. 183 p. [Revised January 1973.] (ED 081 618.)

Prepared for the employees of the Soil Conservation Service (United States Department of Agriculture) to assist them in increasing their knowledge and understanding of the environment, this syllabus may also serve as a resource and reference guide for environmental studies or for purposes of curriculum development. The sixteen-unit course consists of reading assignments, activity assignments, subject information summaries, support materials and response sheets. Topics are: the 'original' American situation; changes in America since AD 1500; basic biological concepts; basic ecological concepts; the atmosphere; soils; freshwater and its pollution; oceans and estuaries; natural areas and their use; wildlife; population of human beings; solid waste problems; persistent chemicals in the environment; radioactive fallout; living space and recreation; and the law and the environment.

8. Antoine, M.S.; Duret, A., eds. *Teaching and environment: international colloquy, Aix-en-Provence, 16-21 October 1972.* Vol. 9. Paris, La Documentation Française, 1973. [English translation of *Environnement*.]

This internationally colloquy investigates the best means of environmentally educating today's youth (mainly primary and secondary pupils). Emphasis is on incorporating environmental concerns into existing subject areas, not just the biological sciences.

9. Appleyard, D., et al. *The Berkeley environmental simulation laboratory: its use in environmental impact assessment*. Berkeley, CA, Institute of Urban and Regional Development, 1973. 23 p. (ED 083 808.)

An environmental simulation laboratory at the University of California is testing the adequacy of different techniques for simulating environmental experiences. Various levels of realism, with various costs, are available in different presentation modes. The simulations can aid in communication about and the resolution of environmental issues, serve as planning tools and as the basis of educational films, depict technological innovations and fantasy futures, and assist research in environmental psychology.

10. Arab League Educational, Cultural and Scientific Organization (ALECSO). *Environment in educational programs*. Report of the preparatory committee. Cairo, Aleco and United Nations Environment Programme, 1974.

Source books in environmental education at the general education level, university level and for the general public.

11. Ashbaugh, B.L. New interpretive methods and techniques. *Journal of environmental education* (Madison, WI), vol. 2, no. 1, fall 1970, p. 14-16. (EJ 029 560.)

Creative and innovative-interpretive facilities and effective methods of teaching people fundamental ecological principles.

12. Baker, H.H. Jr. A new direction for federal environmental education. *Peabody journal of education* (Nashville, TN) vol. 51, no. 1, October 1973, p. 4-11. (EJ 088 812.)

Considers the role of the government in shaping a national environment policy.

13. Balbino León, J.; Franklin, Haydée M. de. *Bases conceptuales y metodológicas para el diseño de alternativas en ecología de un manual regional latino-americano para docentes de niveles básicos*. Informe para la Oficina Regional de Educación de la Unesco para América Latina. Caracas, Universidad Central de Venezuela, 1975.

14. Baltes, Margaret M. *Operant principles applied to the acquisition and generalization of nonlittering behavior in children*. Morgantown, WV, West Virginia University, 1973. 69 p. [Ph.D. dissertation.] (ED 088 700.)

The investigator felt that littering is a behaviour contingent upon certain environmental conditions and that these conditions should be examined systematically. Specifically, this study sought to examine the effects of a behaviour modification approach to littering with eight four-year-old subjects. Using token positive reinforcement, token punishment, rule reinforcement and rule punishment as the experimental conditions, token positive reinforcement was most effective in gaining control over nonlittering behaviour in terms of acquisition, maintenance and generalization.

15. Balzer, L. Environmental education in the K-12 span. *American biology teacher* (Washington, DC), vol. 33, no. 4, April 1971, p. 220-5. (EJ 037 599.)

Described a science-based, three-dimensional model (affective, cognitive, and processes and skills) for environmental education for grades K-12. Provides illustrative behavioural objectives and suggests lists of content and learning experiences suitable for primary, intermediate, middle and high school students.

16. Beal, W.K. Conservation and the schools. *Trends in education* (London), no. 29, January 1973, p. 27-32.

Discussion of the ways in which environmental studies are being introduced into primary and secondary schools in the United Kingdom, resulting from the emphasis placed on the United Nations Conference on the Human Environment held in 1972.

17. Bennett, D.B. Evaluating environmental education programs. *Environmental education* (New York, Halsted Press), 1974.

Provides a model for evaluation based on the goals of environmental education and psychological theory of the cognitive, affective and psychomotor domains. Uses the criteria-referenced, behavioural objective approach to provide a basis for developing test items appropriate to three kinds of evaluation—formal pencil and paper, observation and unobtrusive. Describes research design and evaluation techniques used to apply the model in an assessment of a secondary school environmental education programme.

18. Bennett, D.B. *A report on research and development in environmental education*. Yarmouth, ME, Maine Environmental Education Project; Upper Montclair, NJ, New Jersey State Council for Environmental Education, 1974. 41 p. (ED 091 218.)

The first section of this document contains a report on research conducted to develop a model to evaluate the attitudinal and behavioural goals of K-12 environmental education. The goals of environmental education are specified, the desired skill outcomes are listed, examples of evaluative techniques are given, and an evaluation of a two-week unit on the environment taught to junior high school students is described. The second section covers a project aimed at developing a model curriculum for environmental education. Criteria and assumption are specified; then details of a conceptual model are provided.

19. Berry, P.S. *National survey into environmental education in secondary schools*. Walton-on-Thames (United Kingdom), The Conservation Society/Conservation Trust, 1974.

20. Binder, E. Teaching of environmental sciences at the university level. *Prospects, quarterly review of education* (Paris, Unesco), vol. 2, no. 4, winter 1972, p. 467-71. [Also published in French and Spanish.]

The organization of education on nature conservation should revolve around the training of conservation experts. The university should make scientists aware of this problem, should train students, teachers and specialists, and promote research.

21. Birch, C. Social responsibility in science. *Search* (Sydney), vol. 3, no. 4, April 1972.

The author stresses that science in the 1970s will be drastically different from science in the 1960s; exploding the myth of the neutrality of science, scientists will be forced to research areas that are urgently relevant to human needs. No longer blameless for the abuse of their discoveries, scientists will be held responsible to interpret the significance of science to society, to assess its consequences and to influence its use. This is a call for the training of future scientists along these lines. School curricula should be relevant to the needs of man and his environment dealing with such issues as: population, pollution, conservation, resource utilization, and political and economic considerations.

22. Birch, P.; Harris, M. The environmental studies approach. *Dialogue* (London), no. 6, August 1970, p. 7-9.

Description and philosophy of the Environmental Studies Project for 5-13 year olds. Environmental studies are described as an educational approach available to a teacher based upon direct experience of the environment. The approach leads naturally to an overflow of study into many aspects of the curriculum—especially in the fields of language, and mathematics. Specialist materials are available for teachers only.

23. Birnbaum, H. Tsukuba—Japan makes a major commitment to the future. *Mosaic* (Washington, DC), vol. 4, no. 2, spring 1973, p. 24-9. (EJ 082 035.)

Describes a new town—Tsukuba—which is dedicated to science and education.

24. Blackbourn, A. Environmental studies in German schools. *Journal of geography* (Coral Gables, FL), October 1972.

This article outlines the curriculum of an environmental studies course proposed by the government of the Federal Republic of Germany for grade 12. The emphasis in this geography course is on environmental problems around the world, for example: the problems of cleaning an international river (The Rhine); and smog problems in the Ruhr, London, New York and Los Angeles. Group work and research reports are promoted. Similar courses are urged for the elementary and middle school.

25. Blezard, D. Producing science programmes on television. *Educational broadcasting international* (Oxford), vol. 5, no. 2, June 1971, p. 75-8. (EJ 052 686.)

The use of educational television and production techniques in broadcasting science instruction and laboratory procedures.

26. Boone, Janice R. *Simulations, concern level, grade level, and sex as factors influencing the assignment of importance to environmental concepts*. College Station, TX, Texas A&M University, 1972. 132 p. (ED 070 621.)

This research was intended to examine whether treatment, sex, grade level, environmental concern level, and the interactions of these variables were significant in the assignment of importance to environmental concept statements. In addition, the study was intended to determine whether or not the pattern of responses of junior high school students to a set of standard questions was related to the responses of some adults concerned by the environment. The pattern of responses of the junior high school students was found to be similar to that of an environmentally concerned adult population. Furthermore, some students who were following an instructional programme in ecology/environmental management, which included the use of simulations, assigned higher values to the environmental concept statements than did those who received no instruction and those who received instruction without simulation.

27. Bryant, J. *Translation of existing national park service and NEA publications into Spanish and French*. Washington, DC, National Park Foundation, 1973.

A National Park Service (NPS) environmental education publication translated into Spanish and French to promote the establishment of National Environmental Study Areas (NESA) in Spanish and French-speaking communities. The NESA programme is designed to develop an environmental ethic among student and adult participants. The publication is a revised and combined edition of 'NESA, a guide', an NPS publication, and 'Man and his environment', a National Education Association publication designed to serve educators. The guide will have a feedback system built into it. The NPS Office of Environmental Interpretation will act as a clearinghouse for compiling, editing and disseminating suggestions and evaluations which are received from users. It is anticipated that the translation will aid in the international dissemination of NESA's ideas and techniques.

28. Budde, D.I. State regulations and requirements dealing with environmental education. *Science teacher* (London), vol. 37, no. 6, September 1970, p. 35-6. (EJ 026 125.)

29. Budowski, G. IUCN conservation programs. *National parks and conservation magazine* (Washington, DC), vol. 46, no. 9, September 1972, p. 24-5. (EJ 064 684.)

A brief, but comprehensive, description of the International Union for Conservation of Nature and Natural Resources (IUCN), a non-governmental organization located at Morges (Switzerland). Presents its objectives, broad purpose and describes the specific activities of the organization.

30. *Bulletin of environmental education* (London, Town and Country Planning Association), no. 16/17, February 1972.

Bulletin describing the establishment of the Leicester Town Trail, an urban trail which takes a whole look at a city and uses all senses to learn about one's surroundings.

31. Burnett, R.W. Foreign and international programs. *Review of educational research* (Washington, DC), vol. 39, no. 3, October 1969, p. 445-58. (EJ 012 672.)

Programmes in science curriculum development, including Unesco pilot projects and research projects.

32. *Canadian urban dynamics project: project Canada west*. Edmonton, Alberta, Western Curriculum Project on Canada Studies, 1972. 37 p. (ED 071 947.)

This is a progress report of a curriculum development project aimed at involving students in community and regional development by creating an awareness of urban problems and instilling a sense of responsibility which will stimulate active community participation. The work of the planning team has been concentrated in three areas: (a) development of simulation activities and related background materials; (b) increase in knowledge of urban phenomena by teachers and students and a continuing awareness of availability of educational and resource materials; and (c) itemization of significant case studies. A series of eleven units of studies are included, each dealing with urban studies planning, growth, environmental factors, political and social phenomena, the relationship between urban and rural areas, etc., and lists activities and materials or any special conditions needed. Included in the appendixes are an annotated bibliography of some simulations tested; instructional outlines for student projects, evaluation procedures, and the budget. Outside activities related to the project involving developers are listed. Two working papers detailing future goals and activities are appended. The emphasis is on involvement of additional teachers and the promotion of school-community relationships to encourage student participation in community problems. (See also items 210-12.)

33. Carson, S.M. *Environmental studies: the construction of an 'A'-level syllabus*. London, National Foundation for Educational Research, 1971. 157 p. (ED 070 635.)

Environmental studies for the upper secondary school. Interdisciplinary approach on the impact of human society on the environment.

34. Carter, Doris M. The use of vision as the primary mode of perception in the teaching of environment education. *Art education* (Washington, DC), vol. 26, no. 5, May 1973, p. 20-1. (EJ 075 969.)

This article makes suggestions for enlightening students in their awareness of the environment.

35. Čerovsky, J. The commission of education of the International Union for the Conservation of Nature, with special emphasis on projects and the role of North-West Europe committee, a report. In: IUCN. *Environmental education in an urban society*. Morges (Switzerland), 1972, p. 69-86. (IUCN publications new series. Supplementary paper no. 37.)

36. Čerovsky, J. Environmental education: an urgent challenge to mankind. *School science* (New Delhi), vol. 8, nos. 1-2, April 1970, p. 2-8.

A general paper tracing progress since the 1968 Unesco conference on the biosphere. Defines environmental education as well as its concepts and functions. Čerovsky makes recommendations for what broad topics should be covered at various school levels. Some of this material comes from a talk given in Stuttgart in May 1969. Emphasizes the need for international co-operation.

37. Čerovský, J. Environmental education as an integrating concept in science teaching. In: Unesco. *New trends in integrated science teaching*. Paris, 1973, p. 127-41.

This chapter develops the theme that environmental education serves as an ideal integrating concept for science teaching and for education generally. Three major stages can be distinguished: (a) teaching from the environment; (b) teaching about the environment; and (c) teaching for the environment. The emphasis in primary and secondary schools can correspond approximately to these stages. A curriculum based on the environment is integrated from the beginning and has advantages over co-ordinated or combined courses in which disciplines are brought together. The use of field studies in integrated science is considered along with the place of 'conservation' in education.

38. Čerovsky, J. Problems of interpretive and information services. *World national parks: progress and opportunities*. Brussels, Hayez, 1972.

39. Chaudhuri, N., ed. *Summary report: all-India convention on environmental education*. Calcutta, 1974.

Includes reports on human settlements, resource planning, ecology and pollution.

40. Childress, R.B. *Mobile environmental education laboratory project. Final report*. Kingsport City Schools, TN, 1973. 77 p. [Tennessee Valley Authority demonstration project.] (ED 086 494.)

This report details the development and implementation of a Tennessee Valley Authority-funded demonstration environmental education project and the utilization of a mobile laboratory for conducting studies. Instructional materials were developed that are interdisciplinary in nature and activity oriented in approach. A discussion of the design and equipment for the mobile unit is included. Its use in in-service training and an evaluation of the first year's operations are presented.

41. Clausen, B.; Iverson, R.L. *Environmental quality and the citizen: a teaching guide for adult education courses related to the environment*. Ankeny, IA, Conservation Society of America, 1973. 48 p. (ED 077 691.)

This guide was written to aid the organization of an adult education course on the environment. Each of the ten sessions in the guide is an independent unit—to be used as such or to be interchanged with other sessions. The topics or units are titled: environmental quality—everyone's responsibility; land and space resources; population stress and its implications; energy needs of society; production—consumption patterns; perspectives on pollution; food and fiber; water resource management for all; cultural and recreational needs; and environmental quality for you. Each unit is composed of four parts: (a) objectives—behavioural objectives are developed to give direction to the session; (b) background information—a brief textual statement designed as a point of departure for classroom presentations and discussions; (c) teaching activity—a different teaching technique for each session designed to involve the class in discussion of environmental areas of concern and to seek possible solutions; and (d) references. In addition, a list of general course objectives and a bibliography related to natural resources and the environment are provided.

42. Cohan, P.H. *Environ county: a gaming situation of regional planning process*. Oak Ridge National Laboratory, TN, 1973. 91 p. (ED 085 317.)

'Environ county' is a simulation gaming activity designed to provide insight into regional planning. Developed as a learning experience for decision makers and public participants, the simulation emphasizes the integration of political, social, economic and environmental issues in the resolution of five complex socio-technical problems. The game simulates a meeting of the Regional Planning Commission of a fictitious county in

which participants assume roles of commission members and interested citizens. Package data includes a newspaper, a large three-dimensional model of the county, a notebook of resource information and a general introduction with regulations. An informal atmosphere of leaderless group discussion and a formal structure of parliamentary procedures force a confrontation and decision on the problem and issues presented. The political, social, economic and environmental considerations that should arise during the game are discussed in the handbook, as well as intended audience participation roles. Details of the evaluation process, a list of county participants and a description of the county are appended.

43. Conference on Conservation of Nature and Natural Resources in Tropical South-East Asia. *Conservation education and training*. Morges (Switzerland), International Union for the Conservation of Nature, 1968. 90 p. (IUCN publications new series. Supplementary paper no. 11.)

44. Conference on Education and the Environment in the Americas. [A report and working papers.] Washington, DC, Organization of American States, 1970.

45. *Conservation education at the university level*. Papers presented at the Symposium on Conservation Education, Lucerne (Switzerland), 23-24 June 1966. Morges (Switzerland), IUCN, 1967. [IUCN publications new series. Supplementary paper no. 9.]

Topics included are: principles and forms of teaching conservation, role of IUCN in higher education; attitude development in conservation; plus reports on trends in conservation education at the university level in several countries (Czechoslovakia, Finland, German Democratic Republic, United Kingdom, United States of America and others).

46. Coverdale, G.M. Biology and the peasant farmer. *Journal of biological education* (New York, NY), vol. 7, 1972, p. 40-6.

This article is concerned with the link between education and rural development in developing countries. Training teachers and establishing rural schools are discussed as each relate to biological concepts.

47. Cowan, D.J. Environmental topics in an undergraduate physics curriculum. *American journal of physics* (New York, NY), vol. 40, no. 12, December 1972, p. 1748-56. (EJ 067 676.)

The number of bachelor's degrees in physics awarded annually is declining, but this trend may be reduced by increasing the versatility of the degree. One method is to apply physical principles to the following areas of environmental change: air pollution; energy conversion and resources; environmental radiation; noise; thermal pollution; transportation; and water pollution. Bibliography included.

48. Croisé, D., et al. L'écologie et l'enfant. *L'éducateur* (Cannes), n°s 18-19, 1973, p. 13-36.

Contents (in French): Introduction; some pupils from class CM2 at work in their forest; Albert Schweizer youth clubs; around about the new school; a workshop for the environment, discovery and protection; 'Happiness place', a scenic game; in a small village in Calvados; a year's work in the fifth transition; the children of the *corrida*; an exhibition by children and for children; from the wasps' nest to biological culture; what we will do in class; visit to Haye Zoo; a green class experiment; are they giving us valid information?; some children's comments; education and ecology.

49. Curso sobre Educación en Población, Ecología y Familia, Bogotá, 8 de mayo - 2 de junio 1972. *Informe final*. Santiago, Oficina Regional de Educación de la Unesco para América Latina y el Caribe; Instituto Colombiano de Pedagogía, 1972.

50. Dallas, B., ed. *People power protection: a catalogue/handbook for research and education in defence of the environment*. Hobart (Tasmania), Tasmanian Environmental Centre, 1975. 155 p.

Material from a data bank has been organized in an effort to have an environmental-based classification system most likely to satisfy the needs of the Tasmanian public.

51. Dean, P.G. The use of computer simulation for experimental biology in the upper secondary school. *Journal of biological education* (New York, NY), vol. 7, 1973, p. 29-32.

Outlines the concept of simulation and gives examples.

52. Debesse-Arviset, M.-L. *L'environnement à l'école: une révolution pédagogique*. Paris, Presses universitaires de France, 1973. 136 p. (Collection « SUP ». L'éducateur, 42.)

53. Deer, Christine. Case study of the postgraduate diploma in environmental studies at Macquarie University. *The Australian science teachers' journal* (Parkville, Victoria), vol. 20, no. 2, 1974, p. 31-6.

A description of the environmental programme at Australia's Macquarie University. People of varying backgrounds are given the opportunity to interchange ideas and to participate in solving current environmental problems. The assessment of proposed actions on the environment is a particular feature of the programme. In addition to stressing general environmental principles, the programme also includes environmental impact assessment, management, environmental chemistry, urban ecology and teaching methods.

54. Delu ohrany prirody [For the protection of nature]. *Vestnik vysshej školy* (Moskva), no. 11, 1973, p. 31-6.

During recent years a training system for specialists in the protection of the natural environment has been introduced into higher education in the Soviet Union. Some new directives were defined in the decision of the USSR Supreme Soviet, 'On measures for the further improvement of the protection of nature and on the rational utilization of natural resources' (1972), and in the joint resolution of the CPSU Central Committee and the USSR Council of Ministers, 'On the intensification of nature protection and on the amelioration of the utilization of natural resources' (1972). The three short articles contained under the above heading describe the content and organization of environmental education in two teacher training institutes (Leningrad and Krivoj Rog) and in Tomsk Medical Institute.

55. [Denmark and pollution.] Copenhagen, Det danske Selskab, 1973.

A series of small articles on Denmark and pollution. Air pollution has not been a problem of great concern, but population control, noise control, and oil and chemical refuse treatment have. This publication gives a thorough overview of the status of various anti-pollution measures introduced between 1969 and 1972. The Danes stress their responsibility, as a technologically wealthy nation, to make sacrifices in order to co-operate with developing countries on environmental projects of benefit to all.

56. Destination Unesco: a voyage of discovery around the world. *The Unesco courier* (Paris), August-September 1976. [Also published in Arabic, Dutch, French, German, Hebrew, Hindi, Italian, Japanese, Persian, Portuguese, Russian, Spanish, Tamil and Turkish.]

A special issue celebrating the thirtieth anniversary of Unesco reviews many of its activities around the world. The environmental conservation aspects of Unesco's programme are described, among other activities, in a comic-strip form. It puts the worldwide aspects of environmental conservation in a proper and colourful perspective for the young and not so young.

57. Deutschman, H., et al. Urban laboratory + city problems + high school students = educational success. *Engineering education* (Washington, DC), vol. 63, no. 8, May 1973, p. 585-6. (EJ 083 400.)

Discusses a six-week course in urban problem solving conducted by Newark College Engineering for high ability, inner-city students. Indicates that the experiment of mixing urban laboratories, city problems and high school juniors was an educational success.

58. Disinger, J.F.; Lee, Beverley M. *A directory of projects and programs in environmental education for elementary and secondary schools*. 2nd. ed. Columbus, OH, ERIC Information Analysis Center for Science, Mathematics and Environmental Education, 1973. 686 p. (ED 086 558.)

The second edition of this directory describes 296 projects and programmes which are representative of current environmental education projects and programmes in the United States. They cover all types of operation from well-financed projects to 'shoe-string' operations conducted by one person in his spare time—from classical nature study to modern urban studies. Thus reflected is the fluidity of definition currently characterizing environmental education, as well as differences in levels of support accorded by various agencies in diverse places. Information accompanying each entry outlines the following: project title; director's name and address; headquarters location and facilities available; principal staff; project history; present commercial affiliations; project objectives; materials produced; materials available free of charge; materials for purchase; additional materials being developed; project implementation; teacher preparation; project evaluation; summary of activities since 1969; plans for the future; and materials available through the ERIC system. Entries are arranged alphabetically by state.

59. Dobrev, Z. [Nature study syllabus.] *Načalno obrazovanie* (Sofia), vol. 12, no. 2, 1972, p. 23-30. [Original title and text in Bulgarian.]

Problems concerning instruction in organic and inorganic nature study are discussed with practical examples of suitable teaching methods. Pupils in the fourth form of primary schools are taught to recognize differences between objects, minerals and animals. This was envisaged as the first stage of interdisciplinary programmes.

60. Donaldson, G.W. Research in outdoor education. *Journal of environmental education* (Madison, WI), vol. 3, no. 4, summer 1972, p. 9-10. (EJ 061 155.)

Summary of research studies needed in the field of outdoor education: historical, philosophical, content, evaluative, teacher education and administrative. Past research is also reviewed.

61. Doraiswami, S.; Galushin, V.M. Problems of 'conservation of nature' in the school curriculum in India. In: International Union for the Conservation of Nature. *Environmental conservation education problems in India*. Morges (Switzerland), 1970, p. 8-13. (IUCN publication new series. Supplementary paper no. 25.)

62. Doraiswami, S.; Galushin, V.M.; Meyer, G.R. Main principles of the biology syllabus for the middle and senior high school. *School science* (New Delhi), vol. 7, no. 1, p. 26-30.

Since 1968/69 all schools in Delhi have taught biology as a separate subject from class 6 onward. This article outlines the characteristic features of the course in both middle and senior high schools. The emphasis is on experimental and practical classwork and field trips.

63. Dorsey, A.H.H. *A survey study of the comparative status of understanding and reasoning in conservation concepts by ninth grade students in the public schools of South Carolina*. Charlottesville, VA, University of Virginia, 1972. 135 p. [Ed. D. dissertation.] (ED 076 320.)

The problem under consideration in this study was the status of understanding and reasoning in conservation concepts and principles shown by grade 9 students in the public schools of South Carolina. Forty-eight schools were chosen including: urban, suburban and rural locations; schools with over 650 and under 650 enrolment; and two conditions of race predominance—black or white. Analysis of the findings indicated that significant differences existed. Urban and suburban schools showed no significant differences, but both scored significantly higher than rural schools. With few exceptions, large schools scored slightly higher than small schools; students from predominantly black schools scored lower than students from predominantly white schools; and generally males scored higher than females. It was concluded that students' understanding and reasoning in concepts and principles of conservation do differ when related to school size, school location, race predominance and sex. It was further concluded that adequate programmes and instructional methods should be developed not only to moderate these differences, but to provide an opportunity for increased emphasis upon economic, sociological and human aspects of conservation.

64. Dowdeswell, W.H.; Potter, I.C. An approach to ecology teaching at university level. *Journal of biological education* (New York, NY), vol. 8, no. 1, 1974, p. 46-51.

An outline of experimental ecology courses at Bath University, which include: (a) an integration of zoological, botanical and microbiological components; (b) simulation experiments in the laboratory; (c) an extensive use of slides; (d) the use of research papers; and (e) the utilization of personal research interests.

65. Durant, R.H.; Mikuska, J.M. A practical recycling project. *Science activities* (Skokie, IL), vol. 9, no. 1, February 1973, p. 14-15. (EJ 073 312.)

Describes a school district's recycling programme of aluminium lunch trays which are collected after their use. The trays are used as scrap metal in industrial education workshops and used for sand castings.

66. Eber, R. *Handbook for ecology action*. San Francisco, CA, Sierra Club, 1972. 56 p. (ED 071 865.)

This handbook has been compiled to aid concerned individuals and ecology groups to define their goals, initiate good programmes and take effective action. It examines the ways a group of working individuals can become involved in action programmes for ecological change. Part I deals with organization, structure, conflict resolution, funding, publicity and central office location. Part II is concerned with action. This involves attitudes to be developed in line with the direction of efforts, developing public awareness, criteria for choosing a project, areas of involvement, getting the message across, political action and legal action. Information supplied in the appendix provides a sample constitution, an action-oriented bibliography, and lists of information sources for environmental education, endangered species of wildlife, biocides, and air, water and noise pollution. Although the booklet is based primarily on college campus experiences, it may be useful for all types of ecology action groups.

67. Eckman, T., comp. *Environmental games and simulations*. 1974. 9 p. [Mimeo.] (ED 091 161.)

This publication consists of a list of thirty-five environmental games on the market today, including their source and purchase price. A description is included of the major changes the types of games have undergone. The first group of games resembled closely ordinary board games with success dependent upon skill and/or chance rather than

understanding of the subject matter. The 'second generation' attempted to simulate reality more closely and decreased the role of chance. The latest group of games are simulations which attempt to reproduce a simplified reality. Also included are several suggestions for the teacher who wishes to utilize environmental games.

68. Eden, R.A. *Higher education programs in environmental education in Great Britain*. London (Ontario), IUCN International Workshop, 1972.

69. *Education and the environment*. Report of the multi-state conference, 8-10 November 1971, Annapolis, MD. Baltimore, MD, Maryland State Department of Education, 1971. 27 p. (ED-075 214.)

With assumptions in mind that the environment has emerged as a legitimate concern of schools and that environmental education is interdisciplinary, the Maryland State Department of Education held a meeting for representatives from various parts of the country concerning the possibility of connecting education and the environment. Teams of specialists from eight states met for three days with consultants from the National Science Foundation, the Office of Education and the National Education Association. Before the conference began each state submitted a brief report of what it had done concerning environmental education. During the sessions participants were asked to respond to three major objectives by identifying: (a) the contribution of each subject area to a comprehensive programme of environmental education; (b) the contribution of interrelated approaches to environmental education; and (c) new strategies of implementation and sources of funding for comprehensive environmental education programmes. Responses to these objectives constitute the bulk of the report.

70. *Education in Africa: what goals come first?* *Carnegie quarterly* (New York, NY), vol. XXIII, no. 1, 1975.

71. Efimova, V.I. Itogi prirodoohranitel'noj raboty za devjatuju pjatiletku [The results of out-of-school work on nature protection during the ninth Five Year Plan]. *Biologija v škole* (Moskva), no. 2, 1976, p. 80-3.

72. Eichler, A. *La enseñanza de la conservación de la naturaleza en Venezuela*. Mérida (Venezuela), Universidad de los Andes, 1968.

73. *Ekistics: a guide for the development of an interdisciplinary environmental education curriculum*. Sacramento, CA, California State Department of Education, 1973. 76 p. (ED 076 438.)

Based on a state requirement that all elementary and secondary schools provide instruction in the wise use of natural resources and protection of the environment, the California State Department of Education has developed this guide to assist local education agencies in translating legislative mandates into action. It offers structures and guidelines for developing a curriculum suited to local needs and meeting state requirements. The concepts developed for the study of conservation and environmental protection go beyond the more traditional nature study and appreciation to consider the areas of the social sciences, science and humanities. The definition and basis for ekistics are explored and ideas for developing the ekistics curriculum are expressed. Cognitive-affective frameworks and curriculum outlines for elementary, junior and senior high school levels are constructed for this purpose. A detailed example is given for the elementary school level. Strategies for teaching and learning at all levels are also discussed.

74. Emmelin, L. *Environmental education at university level*. Strasbourg, Council of Europe, 1975. 150 p., bibl. [Also published in French.]

75. *L'enfant et l'environnement. Les informations du Ministère de l'éducation nationale* (Paris), no. 28, février 1974, p. 1-3.

The Minister of Education enumerates the efforts undertaken to make pupils more aware of environmental problems and draws attention to the relevance of this pamphlet for teachers involved in this activity.

76. *The environment film review: a critical guide to ecology films*. New York, NY, Environment Information Center, 1972. 155 p. (ED 070 589.)

Critical reviews of more than 600 environmental films selected from a field of several thousand. Designed to provide a comprehensive selection of films covering all aspects of environmental affairs, from air pollution to wildlife, the guide is primarily user-oriented. It consists of two parts: (a) a review section, which contains film reviews according to the twenty-one subject categories in the ACCESS system; and (b) an index system, which permits the location of films by subject, industry, sponsor and title. Each review provides the film title, physical characteristics, date, sponsor, producer and/or distributor, intended audience, cross references to other sections, and a rating followed by a synopsis of content, treatment and ecological objectivity. The end result is a pattern of different subjects, treatments and styles, ranging from cartoons and TV documentaries to surrealist/impressionist pieces and lectures. Summary comments suggest that most films point an accusing finger with an emotional commentary; few illuminate the root causes of pollution, explore alternatives and examine solutions. Progress is required in the film industry to provide education about the legal, technical, political and economic complexities of the problem.

77. *Environmental science*. Toronto, Ministry of Education, Intermediate and Senior Divisions, 1974. [Also published in French.]

This document is a guideline for the development of environmental studies by students and teachers at the intermediate and senior levels. Four aspects of the environment are explored: natural environment and its components; man within the environment; management of the environment; and planning man's future. Topics and activities are suggested in each area. An extensive bibliography is included. The document aims to allow students to develop in many directions and to gain many types of investigative skills. The student is encouraged to become more sensitive to the environment and to environmental concerns.

78. *Environmental science: teachers' edition: probing the natural world*. Tallahassee, FL, Florida State University, Department of Science; Morristown, NJ, General Learning Corporation, 1972. 146 p. (ED 072 952.)

Air pollution, pesticides, water pollution and population are the main topics treated in this teachers' guide, one in a series of Intermediate Science Curriculum Study (ISCS) materials. Part One of the book contains the students' text with subject information, questions and activities. Teachers' notes in the margin indicate the emphasis of each chapter, major points or concepts presented, questions to generate, activities to complete, procedures to follow, equipment needed, and excursions or other experiences to supplement the reading material. Part Two develops the excursions suggested in each chapter and is designed to the same format. They are usually experiments or studies that can be completed in the classroom using other materials. The text includes numerous illustrations.

79. *L'environnement. Pédagogie* (Paris, Centre d'études pédagogiques), n° 8, 1974, p. 643-704.

Since ecology mobilizes public opinion for the best purposes, why not allow it into the schools? But ecology is not an easy subject. Theory leads to practical activities which

can only be carried out in real-life situations. It is not a case of broadening environmental studies, but of putting into practice a multidisciplinary education; to reawaken the pupils' interest in the life that surrounds them through educational means.

80. Eschenback, J. von, et al. A description and analysis of four models on inquiry. *Social studies journal* (Washington, DC), vol. 2, no. 3, fall 1973, p. 26-45. (EJ 088 673.)

Four popular inquiry models on the theme of pollution are described and analysed according to the following guidelines: (a) identification of the components of the model; (b) statement of the author's rationale for the model; and (c) interpretation of implication for classroom management.

81. *Ethics and environment: topics for enquiry and discussion by older children*. London, The Schools Council, 1972. 73 p. (ED 073 916.)

The object of this set of investigations is to start with the problems that beset us in our use of the environment and, through these, to move towards a better understanding of the principles which regulate life on this planet. The topic units are concerned with subjects of environmental importance, each of which deals with some aspect of the ecological balance of the human environment. Each is linked to the others to form a reasonably comprehensive view of man's relationship with his physical and biological environment. Topics and sub-topics are presented in six categories: population; food supply; land use (including leisure); conservation of natural resources (recycling, water, energy, wildlife, natural beauty, soil); pollution; and man and his environment. Material in the individual topics covers: (a) the importance of the topic; (b) some of the problems associated with the area of study, particularly with regard to values; (c) an outline of the subject, its scope and content; (d) some investigations or learning activities; and (e) links, or how the problem and topics are interrelated. The work was developed for the Schools Council 'Project environment'. (See also item 238.)

82. European Working Conference on Environmental Conservation Education, Rüschlikon near Zürich, 15-18 December 1971. *Final report*. Morges (Switzerland), International Union for the Conservation of Nature, 1972. 58 p., annexes. (IUCN publications new series. Supplementary paper no. 34.)

The report of a non-governmental, European working conference on environmental education as a part of an IUCN project. Specialists in environmental education were assembled in order 'to exchange information, to clarify concepts and to formulate specific recommendations for projects and programmes related to primary and secondary education, teacher training, higher education and out-of-school education'. The book contains a large number of concepts and recommendations which are applicable to each of the specific areas under discussion. The conclusions of this conference are available separately from the final report in a special supplement to the IUCN *Bulletin*, vol. 3, no. 2, February 1972.

83. *Exemplary vocational education program based on environmental studies K-14*. Interim report for the period 1 June 1972 to 31 May 1973. Minneapolis, MN, Minnesota Environmental Science Foundation, 1973. 141 p. (ED 078 214.)

The goals of the project described in this interim report were: (a) to develop a systematic manner for delivery of career education relative to environmental education; (b) to develop a system to assist high school dropouts and other out-of-school youth in making career decisions; and (c) to demonstrate the career education concept to other schools in the system. Procedures followed to implement these goals are detailed for the elementary, junior high and senior high schools and for the Community Career Center for school dropouts and other out-of-school persons. Accomplishments included an in-service programme for teachers, special vocational programmes for the secondary grades and operation of a drop-in centre for dropouts which offered information on educational and occupational planning. Conclusions and recommendations indicate that career education must co-ordinate with the existing curriculum and that teachers have a responsibility to develop the programme.

84. Fadelli, P.L. *A study: conservation education and the western textbook*. Sacramento, CA, California State Department of Education, Office of Conservation Education, 1973. 39 p. (ED 073 918.)

The objectives of this study were twofold: (a) evaluating the conservation content in the elementary, intermediate and secondary grade textbooks used in thirteen western states of the United States; and (b) researching, recording, and reviewing the textbook selection procedures. Part I indicates that textbooks are selected either by a state agency or the local school unit, depending on the state's needs and the level of education. The adoption procedures are presented for each of the thirteen states. In addition, a step by step description of the California textbook selection process is outlined together with some ideas for getting additional environmental material into the textbooks and the National Education Association's findings for textbook selection procedures throughout the fifty states. Part II details the evaluation of textbook content, discussing environmental concepts in subject texts for science, mathematics, English, health, history and social studies. Supplementary material includes a sample of the evaluation procedure, a list of general environmental concepts and assessment of fourteen selected textbooks. The study came to the conclusion that there was a true lack of environmental information in the textbooks evaluated.

85. Filinov, G. [Notes on laboratory work in nature study classes—fourth form.] *Načalno obrazovanie* (Sofia), vol. 9, no. 2, 1969, p. 19-25. [Original title and text in Bulgarian.]

When working on nature study projects the class is divided into groups of three pupils. Using laboratory equipment for chemistry and physics (test-tube, asbestos grid, compasses, magnets), the groups were given guidance in discovering the different properties of matter through tests and experiments. The author stresses the fact that this method proved to be stimulating as it furthered an independent approach.

86. Firouz, E. *Opening address to the regional seminar on training of environmental guards and officers*. Tehran, Iran Department of the Environment, 1974.

Environmental problems in Iran have great cultural and geographic importance. The Department of the Environment has the task of preventing spoilation of the environment, as well as educating the public concerning the environment. This has led to the training of environmental guards and officers through a two-year programme of physical and intellectual growth. Courses in ecology and wildlife management, as well as first aid and self-defence, are included. The duties of the guard include wildlife protection, prevention of pollution, patrolling protected areas and guiding the general public on environmental problems. The report contains course descriptions and class schedules.

87. Fluchel, R.W.; Gregory, C.A. *Summary of the American Camping Association's camp ecological training project*. [Martinsville, IN, American Camping Association], 1972. 19 p. (ED 082 986.)

Briefly summarizes the American Camping Association's Camp Ecological Training Project, its goals, accomplishments, problems and future potential as seen by two participants. Creation of an ecological awareness and conservation consciousness were the major goals of the project. The authors visited twenty-nine selected campsites to help develop their ecology nature programmes and to assist in educating staff. Mentions a few of the activities, training methods and techniques utilized, offers suggestions for further programme and staff development, and evaluates director response to the programme and counsellor interest. Additional comments are made regarding scheduling and communication, finance, vehicles, equipment and future programming.

88. Food and Agriculture Organization. *FAO activities in the field of environmental conservation, with special reference to education and training*. Paper presented at IUCN European Working Conference on Environmental Conservation Education, Rüschlikon near Zürich, 15-18 December 1971. Rome, 1971. (ESR: Misc./71/31.)

Deals mainly with environmental training of post-graduate students, extension workers

and direct agricultural producers. Discusses natural resource management, identification and control of pollutants, social and cultural aspects of the environment, and urban planning.

89. Forselius, S. Environmental education in the school curricula: the Swedish example. *Prospects, quarterly review of education* (Paris, Unesco), vol. 2, no. 4, winter 1972, p. 477-84. [Also published in French and Spanish.]

90. Friedrich, K. Umweltschutz, eine Zielsetzung für die Lehrplanrevision der allgemeinbildenden Pflichtschulen [Environmental protection: a design for the revision of general compulsory school curricula]. *Erziehung und Unterricht* (Wien), vol. 122, no. 5, 1972, p. 334-8.

It is necessary to foresee an education for environmental protection and the conservation of natural resources. By way of an example, a model teaching programme is presented on the theme of fresh water, one of man's precious resources.

91. Friesen, D.W. An innovative curriculum for a northern school: the La Ronge ecology project. *Saskatchewan journal of educational research and development* (Regina), vol. 2, no. 1, February 1971, p. 38-43. (EJ 051 598.)

The La Ronge Ecology Project is the development of various educational ideas into an innovative curriculum. Science concepts are taught in the framework of ecology using audiovisual techniques, individual experiments and games.

92. Galushin, V.M.; Doraiswami, S. Three approaches to school environmental education as consecutive stages of its practical implementation. *Prospects, quarterly review of education* (Paris, Unesco), vol. 2, no. 4, Winter 1972, p. 464-6.

93. Gladkov, N.A.; Miheev, A.V.; Galushin, V.M. *Ohrana prirody* [Conservation of nature]. Moskva, Prosveshchenie, 1975. 239 p.

This volume, designed for students in teacher training institutes, includes a discussion of the theoretical principles and history of the conservation of nature. Separate chapters are devoted to the conservation of the atmosphere, water resources, mineral resources, soils, vegetation, wildlife and the landscape. The authors discuss the organization of nature conservation in the USSR, including laws, the government's role, the system of public organizations concerned with nature conservation, as well as international activity in this sector. The final chapter considers the role of nature conservation in schools.

94. Goodman, Denise. The first 'ecology college'. *Change* (New Rochelle, NY), vol. 5, no. 7, September 1973, p. 21-3. (EJ 082 997.)

Offering a single degree—a Bachelor of Arts in Human Ecology—the College of the Atlantic has completed its first year on Maine's Mt Desert Island.

95. Griffith, Fail. Environmental studies—a curriculum for people. *Science and children* (Washington, DC), vol. 9, no. 5, January/February 1972, p. 18-21. (EJ 052 087.)

A brief description of the rationale, materials and results of the environmental studies curriculum.

96. Habrich, W. Umweltforschung in der Schule. Erfahrung eines Obersekundarkurses [Environmental research in the school. Results of an upper secondary course]. *Geographische Rundschau* (Braunschweig), vol. 24, no. 1, 1972, p. 30-3. [English abstract.]

97. Hall, S.K. Environmental science for the non-science major. *Journal of college science teaching* (Washington, DC), vol. 3, no. 3, February 1974, p. 211-12. (EJ 095 108.)

Describes the structure and content of a multidisciplinary environmental science course for non-science majors offered at Southern Illinois University.

98. Hammerman, D.R., comp., et al. *Research in outdoor education: summaries of doctoral studies*. Washington, DC, National Education Association; American Association for Health, Physical Education and Recreation, 1973. 176 p. (ED 088 636.)

Approximately 117 doctoral dissertations on outdoor education which were completed over the last three decades are summarized. They fall into five major categories: (a) proposals for new programme developments; (b) organization and administration; (c) historical analysis; (d) teacher education; and (e) evaluation. The summaries consist of a brief statement of the problem, the procedure followed, and a résumé of results and conclusions. These summaries are intended to stimulate further research and the growth of quality programmes in outdoor education in educational systems.

99. Harman, Carol. *Environmental games: an analysis*. 2nd. ed. Vermont Environmental Center, 1971. 27 p. (ED 067 232.)

This report is a detailed analysis of fifteen ecology kits and/or games. The analysis points out assets and defects of the kits/games and indicates questions and comments which may be helpful in putting the curriculum materials in perspective. Entries are arranged according to elementary or secondary schools. Information about the ecology kits includes contents, additional equipment needed but not supplied, experiments described, and concluding evaluative comments. An abstract of each game appears with concluding remarks.

100. Harper, P.M. Environmental education as an arena of creative conflict. *International understanding at school* (Paris, Unesco), no. 23, April 1972, p. 5-13. [Also published in French.]

On the necessity of introducing environmental education into the schools and how to overcome the difficulties posed by the study of these subjects.

101. Hauge, Kay. *Environmental studies in an elective communication program*. Paper presented at the sixty-second Annual Meeting of the National Council of Teachers of English, Minneapolis, MN, 23-25 November 1972. 21 p. (ED 077 008.)

This paper describes the use and value of courses in the physical environment offered as part of an optional programme in the English high school curriculum. The writer, who has taught some of these courses, argues that there is a definite place for environmental studies in the humanities curriculum. One course, entitled 'Wilderness as a way of life', not only included readings but also asked the student to do some wilderness living and to participate in projects related to these experiences. A course in survival required reading and experience of survival techniques. The author describes some of the books the students read in the course and some of the projects they created. An appendix contains the course outline for 'Wilderness as a way of life', a discussion of some suggested projects for the course, and a list of books, films and other resources relevant to the course.

102. Hawkins, D.E.; Vinton, D.A. *The environmental classroom*. Englewood Cliffs, NJ, Prentice Hall, 1973. 374 p. (ED 075 994.)

Two modern crises—in education and in ecology—can both be alleviated by adopting an 'environmental classroom'; that is, by moving from the traditional classroom to closer contact with the world outside. The first part examines traditional approaches to education and then moves step by step to innovative ones, such as using the educational environment as an educational problem setting and using other real environments outside the school. The second section includes reading selections to stimulate thought about the environment and educational alternatives chosen from such authors as Margaret Mead and Ivan Illich.

103. Heaney, Sally. The effects of three teaching methods on the ability of young pupils to solve problems in biology: an experimental and quantitative investigation. *Journal of biological education* (New York, NY), vol. 5, 1971, p. 219-28.

A comparison of three learning methods—'cook-book', guided discovery and 'didactic with demonstrations'. Guided discovery was found superior to the other two for the following activities: (a) development of problem solving skills; (b) reasoning and recall of biological knowledge; (c) improvement of laboratory skills; and (d) recall and application of problem-solving skills and knowledge to problems in biology that pupils had not previously experienced.

104. Hendee, J.C. Challenging the folklore of environmental education. *Journal of environmental education* (Madison, WI), vol. 3, no. 3, spring 1972, p. 19-23. (EJ 060 341.)

Missionary zeal must be supplemented by rigorous research if environmental education is to contribute efficiently to the alleviation of environmental problems. Objectives pertinent to all programmes are proposed, the folklore influencing these programmes is identified and research issues fundamental to increasing the contributions of environmental programmes to society are posed.

105. Hernandez, D. A 'developing country' shows how: the University of the Philippines Science Education Centre. *Australian science teachers' journal* (Parkville, Victoria), vol. 17, no. 3, October 1971, p. 47-50. (EJ 048 430.)

A look at the curricula, programmes, resource centres and teaching centres for primary and secondary school science in the Philippines.

106. Hill, Wilhelmina. Model environmental education programs. *Journal of environmental education* (Madison, WI), vol. 3, no. 3, spring 1972, p. 28-31. (EJ 061 006.)

Projects are described which were selected in 1972 for development by the United States Office of Education. It lists the project names, locations, administering agencies, director's name, funding levels, students served and a brief resume of project goals and activities.

107. Hobart, W.L. What's wrong with conservation education? *Journal of environmental education* (Madison, WI), vol. 3, no. 4, summer 1972, p. 23-5. (EJ 060 265.)

Conservation and conservation education are critically examined—their definitions, foundations, principles, concepts, weaknesses, failures and successes. It is concluded that educators must first educate themselves, or environmental education will fail—in the same way that conservation education has failed—to educate Americans to the intricate interrelationships of the natural world.

108. Hoffmann, G. Das Raumwissenschaftliche Curriculum-Forschungsprojekt (R.C.F.P.). [Research project on the teaching of environmental sciences]. *Geographische Rundschau* (Braunschweig), vol. 26, no. 4, 1974, p. 153-54.

Report of a meeting of groups from all regions of the Federal Republic of Germany of those working on the environmental teaching project which was concerned with ecological problems related to space utilization, urban space, mobility within towns, urban and non-urban traffic, air traffic and the town, and space and recreation.

109. Hoffmann, L., et al. *Materialien zum Unterrichtsversuch: Kernkraftwerke in der Einstellung von Jugendlichen*. [Materials for educational research. Nuclear technology in youth training.] Kiel, Institut für die Pädagogik der Naturwissenschaften an der Christian-Albrechts-Universität, 1975. 460 p., illus. (IPN-Arbeitsberichte, 15.)

110. Holler, J.D. Effective education through state councils of conservation education. *Science education* (New York, NY), vol. 54, no. 4, October-December 1970, p. 359-62. (EJ 029 482.)

111. Holstein, E.J.; Carlson, A.B. Engineering in its social context—an experimental graduate course. *Engineering education* (Washington, DC), vol. 60, no. 3, November 1969, p. 240-1. (EJ 013 204.)

112. Horn, B.R. *A basic reading list on state environmental education planning processes and problems*. 1973. 6 p. [Prepared for participants at the national conference on Environmental Education Master Planning, Estes Park, CO, May 1973.] (ED 077 699.)

The twenty-six items in this annotated bibliography deal with environmental education, educational programmes, decision making, operational problems, communications, research methods and systems techniques, all related to planning processes.

113. Hoste, R. A bibliography of biology teaching methods. *Journal of biological education* (New York, NY), vol. 5, 1971, p. 67-70.

Includes references for both primary and secondary teaching under the following main categories: (a) aim and objectives; (b) general methods; (c) ecological methods; (d) genetics and evolutionary methods; (e) microbiological methods; (f) sexual education methods; (g) curricular methods; (h) plants and animals in schools; and (i) miscellaneous.

114. Hramušin, I.V. Voprosy ohrany prirody na urokah fiziki v VI-VII klassah [Problems of nature conservation in physics lessons for grades VI-VII]. *Fizika v škole* (Moskva), no. 3, 1976, p. 40-1.

115. Hubendick, B. Museums and environment. In: International Council of Museums. *The museum in the service of man today and tomorrow*. Paris, 1974, p. 39-48.

116. Hughes, R.D.; Walker, D. Education and training in ecology. *Vestes: the Australian universities' review* (Sydney), vol. 8, no. 3, September 1965, p. 173-8.

This article looks at the role of ecological studies in the undergraduate college programme. The authors suggest that this should be the joint endeavour of botanists, zoologists and physical geographers. Case histories should be used to illustrate the operation of scientific processes in ecological studies; field work is encouraged to provide first-hand learning experiences. Post-graduate courses should also be provided, especially in the areas of advanced analysis, instrumentation, special studies and practical application.

117. Hulleman, H.W. *Effect of in-service training on elementary teachers pertaining to science achievements and attitudes toward environmental science*. Ames, IA, Iowa State University, 1972. 149 p. [Ph.D. dissertation.] (ED 079 089.)

The purpose of this study was to determine what changes, if any, occurred in the achievement and attitudes of elementary teachers following an in-service programme in environmental science. The personal and academic characteristics for each of the twenty-five experimental and twenty-five control subjects were obtained for the following features: teaching level, age, experience and formal science training. The test of science knowledge was used to determine their understanding of science principles, and a second instrument was used to measure attitudes toward selected environmental management concepts and toward their adequacy in teaching these concepts. These tests were carried out before and after the in-service training. No significant differences were found between the two groups.

118. Hurych, F. Die Naturbegegnung und ihre Ergänzung [Encountering nature and how to enrich it]. *Welt der Schule. Ausgabe Hauptschule* (München), vol. 25, no. 8, 1972, p. 308-15.

The guidelines for teaching science and nature study, laid down in Bavaria in 1966,

are brought up to date for primary schools in 1971. The article lists some methods of encountering nature—observation, analysis of results—and suggests some ways of enriching nature study through illustrations, films, textbooks, readings, discs, comic strips, etc.

119. International Conference on Environmental Education, 18-21 August 1975. *Environmental education*. Jerusalem, Hebrew University and Environmental Protection Service, 1975. 192 p.

The report of a conference held in Jerusalem in August 1975 at which forty-one participants presented lectures and papers and attended workshops on many aspects of environmental education. Topics range from the general issues on environmental education to the very specific, such as Project Yerucham—a simulation game. The philosophy of environmental education should be to direct it for the benefit of every citizen rather than for the interest of a few specialists.

120. International Conference on Public Education, thirty-first session, Geneva, 1968. *The study of environment in school*. Paris, Unesco: International Bureau of Education, 1968. (Publication no. 314.) [Also published in French.]

Seventy-nine countries responded to a questionnaire on environmental studies which asked: (a) place assigned to environmental studies in school activities as a whole; (b) its relationship with youth movements; (c) aims and definitions; (d) syllabuses and subjects for study; (e) methods, and teaching aids and techniques; and (f) teaching staff. The introduction states that the results of the questionnaire were very varied. The reports presented by the ministries of education of each country are listed.

121. International Conference on Public Education, thirty-first session, Geneva, 1968. *Summary report*. Geneva, International Bureau of Education; Paris, Unesco, 1968. 172 p. [Also published in French.] (ED 077 834.)

Eighty-six countries were represented at this 1968 conference on education. The main points discussed were: (a) the place of international understanding in official and other texts, in teaching, in the family and in out-of-school organizations; (b) international understanding in syllabuses, study of other countries, introduction to major international problems; (c) teaching methods, techniques and materials; (d) training and attitudes of teaching staff; (e) international activities; (f) the place of environmental studies among school subjects, activities and youth movements; (g) aim and definitions of environmental syllabuses; (h) environmental education methods and techniques, complementary activities, library facilities and textbooks; and (i) teaching staff in environmental education. Presents the text of the recommendations adopted at the conference.

122. International Council of Scientific Unions. Special Committee on Problems of the Environment (SCOPE). *Environmental problems in developing countries: a report*. Paris, ICSU, 1971.

A report on natural resources management, pollution, urban centres, as well as education and training. Recommendations on education include establishing educational training as an integrated whole, dissemination of ecological knowledge and awareness throughout the whole of society, and establishing a permanent international commission on environmental education to link regional and national educational institutions.

123. International Union for the Conservation of Nature. Eleventh Technical Meeting, New Delhi, 25-28 November 1969. *Environmental conservation education among populations of rural and woodlands areas*. Morges (Switzerland), IUCN, 1971. 156 p. (IUCN publications new series, no. 20.) [Partially written in French.]

The material presented is drawn from experience of conservation problems and scientific research in southern Asia and supplemented by a limited number of comparable studies

from other parts of the world. Its aim is to illustrate the activities and interests of the Commission on Education of the IUCN. Conservation education in various countries is discussed.

124. Inter-Union Commission on Science Teaching. *Report of the congress on the integration of science teaching*. Droujba (Bulgaria), 1968. [p. 11-19.]

The report includes a definition of integrated science teaching methods and suggestions for the training of leaders for integrated science. A bibliography of pertinent journals, books and papers is listed.

125. Jadan, Doris; Galiber, Rosemary. *The environmental studies program of the Virgin Islands Department of Education*. Charlotte Amalie, Virgin Islands Department of Education, 1973. 81 p. (ED 082 977.)

126. Jensen, R.G.; Jensen, K.C. *Syracuse-Yugoslav project on environmental policy and planning*. Syracuse, NY, Syracuse University Graduate School, 1973.

The Syracuse-Yugoslav Project will develop an interdisciplinary analysis of environmental problems in Yugoslavia, a decentralized socialist society undergoing rapid urbanization and economic development. The project is based at the Urban Institute in Ljubljana. Project activities in both research and education involve joint work by American and Yugoslav experts in environmental education. Project objectives focus on: (a) socio-economic problems of environmental policy and planning with attention to areas where the experience of one country can provide ideas and alternatives for solving the environmental problems of another; (b) means of increasing the exchange of information on environmental problems between Yugoslavia and the United States; and (c) the production of materials describing and analysing environmental problems in Yugoslavia that can be used to enrich environmental curricula in the United States.

127. Jeske, W.E. Should adult education programs include courses relating to environmental concerns? *Adult leadership* (Washington, DC), vol. 21, no. 9, March 1973, p. 283-4, 307-8. (EJ 075 861.)

Speech delivered at the National Adult Education Conference held in November 1972 in Minneapolis, MN.

128. Joganzen, B.G., ed. *Srednjaja skola i ohrana prirode* [Secondary school and nature conservation]. Tomsk, Izdatel'stvo Tomskogo universiteta, 1971.

This monograph consists of a number of articles grouped into three sections: general questions on the protection of nature; environmental education in the teaching programme in the secondary school; and environmental education in out-of-school activities. Part one discusses general questions such as the principles of nature conservation, nature conservation as an important economic problem, and the importance of environmental education for the moral, aesthetic and intellectual education of school-children. Part two provides suggestions for teachers of various subjects with regard to including environmental education in their classes, while part three contains advice on various types of extra-curricular and out-of-school activities connected with environmental education. A well-organized and detailed bibliography is included.

129. Johnson, Carol; Smith, Jacqui. *Directory of environmental literature and teaching aids*. London, Council for Environmental Education, 1972. 129 p.

This directory is a guide to available materials in environmental education covering books, films, filmstrips, slides, posters, study kits, games and workcards. The different sections are printed on different coloured papers and it is possible to add new pages to the binding.

130. Kachroo, P. The educational ecosystem, an intimate look. *Science and culture* (Calcutta), no. 11, 1971, p. 504-9.

The general public is becoming more and more concerned by ecological problems (pollution, overpopulation, etc.). Biology plays a dominating role in these affairs. Should a reform be envisaged in biological education to adapt it to the demands of the modern world?

131. Kelly, J.T.; McCabe, R.H. *An overview of the scope and a description of the components of man and environment television learning systems.* - Miami-Dade Junior College, FL, 1972. 13 p. (ED 067 875.)

In recent years it has become increasingly apparent that man's tendency to destroy nature must be reversed; comprehensive programmes introducing students to the main issues of man living in harmony with his environment are needed. In response to this need a fifteen-week course was devised and programmed to be televised in connection with Miami-Dade Junior College. The components of the course included two thirty-minute telecasts per week, a study guide, an instructional communication and feedback system called Teaching Information Processing System (TIPS), a phone-in radio programme, mid-term and final examinations, and a textbook designed to support the programme. The programme was presented in varying formats and some emphasis was placed on identifying and enrolling certain groups to take the course—school-teachers and Girl Scout leaders for example. Specific goals for the project were established and plans devised for providing support for continual development of new curricula.

132. Kenarskaja, I.V.; Solov'ev, A.K. Nekotorye voprosy sostojaria prirodnoj sredy i ohrany prirody v razvityh kapitalističeskikh stranah [Some problems concerning the state of the natural environment and the protection of nature in the developed capitalist countries]. *Geografija v škole* (Moskva), no. 1, 1976, p. 18-23.

133. *Kenya's national report to the United Nations conference on the human environment.* Nairobi, 1972.

Since 1948 the population of Kenya has doubled with approximately 90 per cent of the people living in rural areas. This has created environmental problems—physical, biological and cultural—most of which are centred around housing. Planning has a high priority in Kenya's development programme. Serious attention is paid to the management of Kenya's natural resources, especially as they relate to agriculture and food production. Pollution is not yet a serious problem, although studies are being made to avoid the risk of large-scale pollution in the future. The contamination of rivers is the most pressing problem in Kenya.

134. Kesteven, G.L.; Maddever, R.S. Ecosystem approach to science teaching. *Education news* (Woden, Australia), vol. 11, no. 1, February 1967, p. 16-18.

Discussion of the Geelong Grammar School Project which organizes science teaching by way of systematic and continued examination of natural systems. The general aims of the project were: (a) to give students opportunities of employing various scientific techniques in a real research project; (b) to enable students to gain a view of the relationship between various fields of scientific inquiry and an understanding of the interdependence of disciplines; (c) to give students a view of an integrated project bearing upon a clearly identifiable ecosystem; (d) to give individual students opportunities for pursuing particular studies within a general project and with the assistance of specialists; (e) to give the students opportunities of meeting specialized scientists; (f) to assist teachers to use a lagoon and material from it as objects for class exercises in science, geography and other disciplines; (g) to give the masters contact with the scientific community; and (h) to give an opportunity of demonstrating to students the relations between social and natural sciences.

135. Kronus, Carol L.; van Es, J.C. *Pollution attitudes, knowledge and behavior of farmers and urban men*. 1972. 28 p. (ED 073 337.)

Data were gathered from a random sample of farmers and urban dwellers on pollution attitudes and knowledge, and household practices with regard to pollution. The results indicate that urban dwellers are more concerned about pollution, are more willing to allocate tax money to clean up pollution, have greater knowledge about pollution of water supplies, and are more likely to favour pollution abatement practices in their households. The argument is put forward that those who favour voluntary controls on pollution abatement are arguing in favour of inaction.

136. Krutikov, V.L. *Ohrana prirody i škola v socialističeskikh stranah Evropy* [Nature conservation and the school in the European socialist countries]. *Geografija v škole* (Moskva), no. 2, 1976, p. 59-62.

137. *La conservación de los recursos naturales renovables en los currícula de la enseñanza media* [The conservation of renewable natural resources in the secondary curriculum]. Córdoba (Argentina), Centro de Ecología y Recursos Naturales Renovables, Universidad Nacional de Córdoba, 1974. 81 p.

Brief summaries of the presentations, conclusions and recommendations of the national seminar held at Valle Hermoso, Córdoba, 16-26 October 1974.

138. LaHart, D.E.; Tillis, C.R., eds. *Strategies for multidisciplinary environmental education*. Tallahassee, FL, State Department of Education, Division of Elementary and Secondary Education, 1974. 78 p. (ED 092 373.)

This volume is a collection of papers each of which develops an intellectual framework for teaching a particular discipline within an environmental context. The subjects included are political science, health education, language or communication arts, art science, mathematics and social studies.

139. Laptev, I.P. *Teoretičeskie osnovy ohrany prirody* [Theoretical principles of nature conservation]. Tomsk, Izdatel'stvo Tomskogo universiteta, 1975. 276 p.

This book is the result of a course given for many years at Tomsk University. It is written in simple language but without damaging the scientific integrity of the work and may be used as a text in nature conservation at the university level. The book is in two parts: scientific principles of nature conservation; and problems of nature conservation. The first section includes a discussion of the history of human ecology and its problems; studies of the interrelationships among the elements of nature and between man and the environment; studies on natural factors involved in negative changes in nature and on natural resources and the conservation of nature. The second part of the book discusses conservation of useful minerals, water, the atmosphere, climate, soil, the biosphere, the cosmos, and problems of preservation of the environment.

140. *Latin American conference on the conservation of renewable natural resources*. Bariloche, Argentina, 27 March-2 April 1968. Morges (Switzerland), International Union for the Conservation of Nature, 1968.

Considers three major topics: international co-operation in conservation education; conservation needs at various educational levels; and the role of conservation education for renewable resources.

141. Laurie, Annie. *Informe del curso de educación sobre población, ecología y familia: Perú*. Santiago (Chile), Oficina Regional de Educación de la Unesco para América Latina y el Caribe, 1973.

142. Laurie, Annie. *Informe del curso de educación sobre población, ecología y familia: República Dominicana*. Santiago (Chile), Oficina Regional de Educación de la Unesco para América Latina y el Caribe, 1973.

143. Lawrence, S.G. Education in a threatened planet—the part that science teaching could play. *School science review* (London), vol. 53, no. 183, December 1971, p. 269-73.

Outlines the need to teach courses that centralize on the theme of man's future on our planet. This could be the concern of all teachers, in all the science disciplines. The article proposes a human ecology curriculum with three main components: population; resources; and environment.

144. Leńkowa, Antonina. Spojrzenie na krajobraz [A glance at the countryside]. *Nowa szkoła* (Warszawa), nos. 7-8, 1971, p. 31-5.

The ecology of the countryside: the necessity for all teachers to become acquainted with basic knowledge of the countryside in order to guide an educational excursion.

145. Levow, R.B. *COFLO: a computer aid for teaching ecological simulation*. Paper presented at the Conference on Computers in the Undergraduate Curricula, Claremont, CA, 18-20 June 1973. Boca Raton, FL, Atlantic University, 1973. 6 p. (ED 084 780.)

A computer-assisted course was designed to provide students with an understanding of modelling and simulation techniques in quantitative ecology. One segment of part one develops mathematical and computer tools, beginning with abstract systems and their relation to physical systems, while the second segment presents modelling principles. A computer language and a model programme are then described in detail, and equilibria and stability are treated. In part two students were burdened with the math requirement and the amount of time spent on programming languages. The first difficulty was overcome by the introduction of compartment flow models, the second by the development of an easy-to-use computer programme. This Compartment Flow Model Simulation Program (COFLO) is an input language which takes a description of a compartment-flow model and simulates the behaviour of the modelled system.

146. Lines, C.J.; Bolwell, L.H. *Teaching environmental studies in the primary and middle school*. London, Ginn, 1971. 80 p. (ED 072 967.)

Although many teachers are convinced of the value of environmental studies, they are often not fully confident of their ability to plan and carry out a first-hand approach to learning. For this reason the authors sought to investigate the problems inherent in this approach and to suggest remedies which are both practical and realistic. The book is divided into four sections. Section I deals with the nature of environmental studies, the role of the teacher, the scientific and creative aspects of the approach, and the contribution which children with informed opinions about their environment can make towards its improvement and preservation. This section also pays attention to environmental studies in relation to immigrant children and children with particular learning difficulties, and its future in the primary and secondary school curricula. Section II discusses the introduction of environmental studies into the school curriculum, assessing the value of different studies, the organization of study, evaluation of children's progress, and 'difficult' environments. Section III sets out a number of case studies and Section IV suggests ways in which teachers can extend and develop their own knowledge and techniques.

147. Linke, R.D. *Environmental education research project, content analysis criteria, report on first evaluation trial*. Clayton (Australia), Monash University, 1972. 30 p. (ED 068 370.)

Ten criteria for assessing environmental education textbooks and similar materials were developed and distributed to thirty members of the Australian Conservation Foundation Education and Training Committees throughout the country. Each person applied these criteria to three chapters of a biology textbook, 'The web of life', and to three units of Australian Science Education Project materials. The results of the rating are presented. The reliability of each index and difficulties encountered in its use are discussed. The materials given to the assessors and the rationale for each criterion are included in an appendix.

148. Linke, R.D. *Environmental science: an experimental programme for primary teachers*. Malvern (Australia), Toorak Teachers College, 1971. 118 p. (ED 070 637.)

A report on an experimental course covering some of the fundamental principles and terminology associated with environmental science and the application of these principles to various contemporary problems.

149. Lockard, J.D. *Science and mathematics curriculum development internationally, 1956-74*. Ninth report of the International Clearinghouse on Science and Mathematics Curriculum Developments. College Park, MD, University of Maryland Science Teaching Center, 1975.

This report contains descriptions of 400 science and mathematics international projects. Each project is classified in several ways, including age of student group, subject area, methods of presentation, available materials and research data.

150. Lucas, A.M. *Environment and environmental education: conceptual issues and curriculum implications*. Columbus, OH, Ohio State University, 1972. 261 p. [Ph.D. dissertation.] (ED 068 371.)

An examination of the concept 'environment' leads to a number of questions that must be answered to reduce ambiguity of any particular use of the term.

151. Luce, T.S.; Volksdorf, N.R. *Evaluation of a university course in the environment: final report*. Tulsa University, OK, 1972. 24 p. (ED 067 279.)

The primary purpose of this study was to evaluate the effectiveness of the university-level multi-disciplinary course on the environment by bringing about heightened awareness of environmental events as reported in the mass media. A second, related study sought to determine whether particular values characteristically associated with the various disciplines could be modified by such a course experience. Two assessment procedures were administered to sixty-one students at the University of Tulsa both before and after a multi-disciplinary university course entitled 'Science, technology and the environment'. Data indicate that there was actually a decrease in awareness of environmental events at the end of the course. Similarly, the subjects showed little change in their value judgements as a result of the course.

152. Lyons, Kathleen P. *A descriptive study of prospective elementary teachers' attitudes relating to environmental problems*. Bloomington, IN, Indiana University, 1971. 110 p. [Ed.D. dissertation.] (ED 076 307.)

The purpose of this study was to determine the effectiveness of a positively-oriented instructional programme in developing a positive attitude towards environmental problems in selected pre-service elementary teachers. In order to discern more accurately the factors involved in attitude change, the number of subjects was limited to three and a descriptive approach was utilized. It was anticipated that this approach might lead to the generation of hypotheses concerning the alteration of environmental attitudes. Analysis of the test instruments permitted the following conclusions: participation in the programme was effective in developing positive environmental attitudes; and the subjects displayed a change or reinforcement of attitude toward specific environmental issues. In addition, it was implied from data collected that: (a) environmental materials used were effective in producing a positive attitude; (b) active participation aided in the development of a positive attitude; (c) the subjects displayed a greater comprehension of ecological principles; and (d) the students in the subjects' classes were influential in causing attitude change.

153. Maassen, B. *Unterrichtsmaterialien zum Bereich Ökologie-Umweltschutz - eine annotierte Bibliographie* [Teaching materials in the sphere of ecology/environmental protection: an annotated bibliography]. Kiel, Institut für die Pädagogik der Naturwissenschaften an der Christian-Albrechts-Universität, 1975. 225 p. (IPN-Arbeitsberichte no. 12.)

A descriptive and evaluative review of biology, geography and social sciences curricula in the Federal Republic of Germany concerned with pollution problems.

154. MacGown, R.H. *The school site in environmental education*. Yarmouth, ME, Maine Environmental Education Project, 1972. (ED 066 308.)

155. Marsden, W.E. Environmental studies courses in colleges of education. *Journal of curriculum studies* (Glasgow), vol. 3, no. 2, November 1971, p. 163-78. (EJ 048 448.)

156. Martin, G.C.; Wheeler, K., eds. *Insights into environmental education*. Edinburgh, Oliver & Boyd, 1975. 199 p.

Nineteen exponents of environmental education throughout the world present case studies describing interdisciplinary insights which could be starting points for curriculum development. Further reading is suggested at the end of each article. The book is designed to stimulate discussion among students and teachers and provides discussion questions and useful addresses.

157. Martin, Marie. *Films on the future: a selective list*. Washington, DC, World Future Society, 1973. 60 p. (ED 074 009.)

This annotated list of films is composed of fourteen subject areas: (a) atomic energy/fuel/power; (b) automation/computer/data processing; (c) biochemical research/behavioural sciences; (d) communications/transportation; (e) concepts; (f) ecology/pollution/weather modification; (g) education; (h) food/population control; (i) oceans/ocean sciences; (j) sociology/future life styles; (k) space/space sciences; (l) technology/business industry; (m) urban planning; and (n) science fiction films.

158. Matos, C.A. *Development of a process curriculum for the intermediate level*. Santurce (Puerto Rico), State Environmental Quality Board, 1973.

A pilot project was conducted in which students in grades 6-12 collected micro-climatological data from their school neighbourhoods. Project MATE (microclimate and the environment) included students from public and private schools. Professionals from the National Weather Service and the University of Puerto Rico provided scientific advice. About 160 'stations' were involved where students took daily readings of rainfall and max-min temperatures. It is anticipated that a detailed micro-climatological model will be assembled which will be related to land use, urban density and shelter modes over the past decade.

159. McCabe, R.H. *Man and environment for secondary schools: a curriculum in environmental studies for high schools*. Miami, FL, National Association for Environmental Education, 1972. 96 p. (ED 086 473.)

This curriculum guide, developed by a workshop in environmental studies for secondary schools at Las Vegas, contains twenty programmes for integrated environmental studies in the secondary school. Each programme includes an overview, a list of concepts and a list of student objectives. In addition, an appendix has suggestions for initiating and implementing the programme in the regular school curriculum. References and possible resources are given.

160. McFadden, Lorraine K.; Tendrick, Dorothy A. Environmental education workshop experience for the mentally retarded. *Mental retardation* (Washington, DC), vol. 8, no. 6, December 1970, p. 29-31. (EJ 033 421.)

161. McGowan, A. An experiment in environmental education. *Physics teacher* (New York, NY), vol. 9, no. 3, March 1971, p. 141-4. (EJ 036 692.)

Describes the content and philosophy of a summer workshop for students and teachers on water pollution.

162. McInnis, N.; Albrecht, D., eds. *What makes education environmental?* Louisville, KY, Environmental Educators and Data Courier, 1975.

A book about environmental education by environmental educators. This collection of forty-one articles is written by current practitioners from the fields of education and environmental concern. This range of practical expertise provides a volume of solid material on the 'nature, promise and future of the environmental challenge to an education system'. The articles are grouped under five headings: (a) 'The basis for environmental education' traces the historical roots of the environmental movements and looks at the economic and political forces that have restrained it; (b) 'Instruction' takes a look at the ways of educating people to environmental concerns through educational curricula at all levels, pre-service and in-service programmes, adult education and community resource centres; (c) 'Environmental perception and communication' attacks the importance of communication skills and self-perception on individual, community and world-wide bases; (d) 'Environmental education advocacy' describes the necessity for establishing and actively pursuing environmental values, illustrating this with case studies on community and global considerations; and (e) 'Environmental education needs' examines some of the areas that need attention in this expanding field.

163. McLean, H.W. Simulation games: tools for environmental education. *Elementary school journal* (Chicago, IL), vol. 73, no. 7, April 1973, p. 374-80. (EJ 075 753.)

The author presents a representative sampling of worthwhile materials that are available and which have been chosen to show variations in the tools used in environmental education programmes.

164. McNeil, R.J. Studying the environment. *Journal of environmental education* (Madison, WI), vol. 3, no. 2, winter 1971, p. 36-40. (EJ 054 397.)

Two correspondence courses, 'Conservation of natural resources' and 'Current topics in conservation' offered by Cornell University, NY, from 1961 to 1967, are described. Facts and statistics are included relating to: advertising; participant characteristics; educational levels and activity interests; preparation of materials; registration procedures; mailings; lesson question sheets; lesson corrections; course completion rate; budget; and recommendations.

165. *Me and my environment. Unit 1: exploring my environment.* Boulder, CO, Biological Sciences Curriculum Study, 1972. 327 p. (ED 071 264.)

Presented is an experimental programme which consists of twenty-nine life-science curriculum activities intended for the 13-to-15-year-old educable, mentally-retarded child. Stressed throughout the programme are ecological themes, inquiry skills, problem-solving skills and environmental elements. Seven to twelve activities for each of the three core study areas within Unit 1 are given of which the following are examples: making a pond; sniffing around; terming categories; and reading a thermometer. Activities are organized into materials, teaching strategies and anticipated student behaviours. The three cores are sensing the environment, investigating the environment, and landmarks in the environment. The ecological theme stressed is the interrelationships of environmental components. Inquiry skills seen to be developed are observing and identifying; problem-solving skills emphasized are experimenting and knowing what the problem is and what to do about it. Environmental elements considered are space and shelter. Behavioural objectives include the development in the student of a sense of self-identity and an attitude of inquiry.

166. Mechling, J.E. *The environment in formal and informal education.* Working paper for the Unesco Conference on Environmental Education and Socio-Economic Planning, Paris, October 1972.

This paper makes general observations on the environment and environmental education and suggests three broad guidelines for Unesco's environmental education projects.

167. Medd, D. Responding to change. *Trends in education* (London), no. 31, July 1973, p. 26.

A look at the open-plan primary school in the United Kingdom and the effect of school design on teaching methods.

168. Menzel E., W. Educación para el ambiente. *La educación* (Washington, DC, Organización de los Estados Americanos), núm. 60-1, 1971, p. 35-9.

169. Mertes, J.D., et al. Living library. *Parks and recreation* (Arlington, VA), vol. 6, no. 10, October 1971, p. 34-5, 63-4. (EJ 043 637.)

'Living library', a series of audio-visual documents concerned with environmental management, has been used on the Texas Tech campus and has also been distributed commercially to disseminate park and recreation philosophies of notable, contemporary leaders in this field.

170. *METRO-APEX gaming simulation*. Vol. 28. Ann Arbor, MI, Michigan University Environmental Simulation Laboratory; Los Angeles, CA, University of Southern California, COMEX Research Project, 1973. 130 p. (OS/360 version; ED 081 619.)

Operator's instructions and technical support materials needed for processing the METRO-APEX (air pollution exercise) game decisions on an IBM 360 computer are compiled in this volume. METRO-APEX is a computerized college and professional level 'real world' simulation of a community with urban and rural problems, industrial activities and air pollution difficulties.

171. Meyer, G.R. *Planning an environmental studies centre*. North Ryde (Australia), Macquarie University, 1972. 25 p. (ED 068 360.)

The educational and administrative planning and development of an environmental studies centre, designed both to synthesize fragments of learning about man and to cater to specialized interests of specific user groups, is illustrated by reference to the potential of an area near metropolitan Sydney as the site for such a field studies centre. The criteria to be met by such a site are enumerated, the types of biological and cultural resources that should be surveyed within the selected area and its neighbourhood, and the criteria to be used in planning the location of buildings, field bases and environmental trails are discussed. The evolution of the centre to allow use by day visitors and, later, residential courses is described, outlining the facilities and staff needed at each stage. Parallel stages in the development of curricula and instructional materials are also considered briefly. The package contains maps, photographs and a cassette recording of a talk describing a model area.

172. Meyer, G.R.; Postlethwaite, S.N. Australian high schools use audio-tutorials in field biology. *The American biology teacher* (Washington, DC), vol. 43, no. 2, February 1970.

Since 1962 the New South Wales school system has had problems with its revised school plan which required field excursions. Instructors and administrators felt that these excursions were an interruption of school routine and a threat to those teachers who were not confident with field excursions. In 1968 Professor Postlethwaite of Purdue University was invited to assist Macquarie University in solving the above problem by adapting his system. Design of science kits on the Postlethwaite format was successfully carried out by teachers who were victims of this problem. Students were then able to go on field excursions outside of school time. The kits are now available to high schools and in-service teacher training schemes in the region.

173. Michajlov, W. Czlowiek, srodowisko, szkola [Man, environment, school]. *Nowa szkola* (Warszawa), nos. 7-8, 1971, p. 4-9.

The attitude of the scientific world and of the United Nations to protect the setting where man has chosen to live favours the laying down of an environmental policy

and the inclusion of the study of the biosphere in school curricula. Suggestions are made for achieving convincing results.

174. Miller, R.G. Educación internacional sobre el medio ambiente. *La educación* (Washington, DC, Organización de los Estados Americanos), nos. 60-1, 1971, p. 41-3.

175. Miller, W. The national environmental education development (NEED) program. *Journal of environmental education* (Madison, WI), vol. 1, no. 2, winter 1969, p. 47-8. (EJ 015 557.)

The purpose of the NEED programme is to instil in the nation's youth an appreciation for, and a desire to improve, the environment.

176. Milmine, Jean Tweedy. *The community nature center's role in environmental education*. Ann Arbor, MI, University of Michigan, 1971.

177. Mirka, G. Factors which influence elementary teachers' use of outdoor classrooms. *Journal of environmental education* (Madison, WI), vol. 4, no. 4, summer 1973, p. 31-3. (EJ 083 249.)

178. Mitchell, Sandra K.; Lunneborg, Patricia W. Effects of environmental education on first graders. *Journal of environmental education* (Madison, WI), vol. 4, no. 4, summer 1973, p. 34-7. (EJ 083 250.)

179. Monroe, Margaret W. *Urban games: four case studies in urban development (operator's manual and player's manual)*. Berkeley, CA, University of California, 1972. 80 p. (ED 077 707.)

A series of role-playing operational games based on the 'policy negotiations' model developed by Dr. F. Goodman. 'Policy negotiations' is a game process that involves playing a priming game in order to learn the procedures and rules of the game so that one can design and play one's own game. The four priming games played here—community issues, rapid transit, industrial park, and regional shopping center—all convey the game process while utilizing individual subject matter around a common urban theme. The operator's manual is for the individual who will lead the game session. It includes a discussion of the value of operational games in the learning situation, the rules of the 'policy negotiations' model, a discussion of how to set up and run a gaming session, the four priming games, and a suggested procedure for building a game on the 'policy negotiations' formula. The players' manual contains a general introduction to the model and scenarios, role descriptions and issues for four priming games. A list of steps to simplify the process of building a new game is also included.

180. Morrison, R.G.B.; Reid, L.J. The case for field studies. *The South Australian science teachers' journal* (Adelaide), vol. 731, April 1973, p. 2-7.

This article reports the results of a questionnaire on the use of field studies in environmental education programmes; the questionnaires were sent to secondary teachers of the natural and social sciences throughout South Australia. Field work was found to be most essential in agricultural science and earth science. The number of students in each field trip averaged forty-four. The main type of activity of the trips was geography, then general interest and biology. In most cases camping equipment was hired for the occasion; low income students were at a disadvantage. The most frequently given reasons for not using field studies were insufficient knowledge of useful areas, too expensive and insufficient training.

181. Mukerji, Rose; Pollak, Ruth S. *Ripples and guide for ripples*. Bloomington, IN, National Instructional Television Center, 1971. 56 p. (ED 079 987.)

Ripples is a catalogue of thirty-six quarter-hour films, which collectively have the same title, designed to help five to seven year olds build human values, increase aesthetic

sensitivity, and understand themselves and their changing world. They emphasize relationships—among people, between people and their environment, and among elements in the physical world. The accompanying *Guide for ripples* provides teachers with an overview of the film programme, shows how the individual films reinforce each other, and covers the teacher's role in connection with the film series and how it helps the teacher to teach. The guide describes each film, reviews its basic ideas and offers teachers suggestions for further activities.

182. *A multi-graded conservation education summer school model*. Novato Unified School District, CA, 1970. 80 p. (ED 067 234.)

Due to the excitement and enthusiasm shown by teachers, students and community members participating in a summer school programme, the Novato Unified School District has compiled this source book to guide others in developing similar programmes. In 1969 and 1970 the school district established a multi-graded conservation education summer school programme for a six-week period, involving seven teachers and 180 students. One of its outstanding features was the use of local environmental studies and community action projects which supplied both relevance to the programme and continuing ideas and projects for the following school year. Within the guide information is recorded on: (a) how to get a programme started; (b) preplanning procedures; (c) publicizing the programme; (d) examples of the daily programme; (e) projects and activities; and (f) evaluative procedures. Appended material includes sources for information and materials, supplies lists and a student-developed consumer handbook.

183. *Museums and environment*. *Museum* (Paris, Unesco), vol. 23, nos. 1-2, 1973. 124 p. [Special issue. Also published in French.]

Traditionally, museums have had a threefold function: documentation, research, instruction. The articles presented in this special issue are meant to explain how these functions can be used by the community in the handling of environmental problems and how museums will be encouraged toward various forms of activity furthering knowledge of our relations with our environment.

184. Myshak, R.J. *Community environmental studies program*. A paper presented to the IPN symposium, Kiel, 1970. Minneapolis, MN, Minnesota Environmental Sciences Foundation, 1970.

This report recounts the role of the Minnesota Environmental Sciences Foundation in environmental studies. Previous work has stressed studies in natural areas; now the emphasis is on studies within the human community. Specific outcomes sought include: (a) improved functional socio-ecological awareness; (b) meaningful training for responsible community membership; and (c) increased emphasis on inquiry training.

185. National Environment Secretariat. *The environment and food production*. Paper prepared for the United Nations World Food Conference, Rome, November 1974.

A report on the use and enjoyment of natural resources, especially pertaining to agriculture. Reports are included on arid areas, grazing land, wildlife, soils, rivers and lakes, fisheries, and human health concerns.

186. *National environmental study area: a guide*. Washington, DC, Department of the Interior, National Park Service, 1972. 61 p. (ED 068 320.) [Also published in French and Spanish.]

This guide is for teachers and resource managers who are interested in establishing National Environmental Study Areas (NESA). It outlines the characteristics and procedures of the programme; the nature, philosophy and purpose of environmental education; and techniques and methodology for environmental studies in NESAs. Programme requirements, programme materials and site characteristics of NESAs are reviewed, together with the processes involved in environmental education and in using

NESA programmes. 'Environmental strands' are universal ideas for viewing the total environment: variety and similarity, patterns, interrelation and interdependence, continuity and change, and evolution and adaptation. The final section deals with establishing a NESA: community assistance; creating a steering committee and responsibilities; presenting the programme to a community council for environmental education; holding on-site workshops; and maintenance of the programme.

187. *National working conference on emerging issues in environmental education*. Ann Arbor, MI, University of Michigan Environmental Education Program; Washington, DC, Office of Education, Division of Technology and Environmental Education, 1974.

188. Newbould, P.J. Conservation in education. In: Warren, A.; Goldsmith, F.B., eds. *Conservation in practice*. New York, NY, Wiley, 1974, p. 437-51.

Conservation education is treated as the education of practitioners, education in informal school settings and on-site education (such as environmental centres, nature trails, etc.). Each area is listed separately with information on present amenities and suggestions for future developments.

189. Newbould, P.J. The contribution of ecology to the study of human ecology. In: Rogers, P., ed. *The education of human ecologists*. Proceedings of a symposium held at Huddersfield (United Kingdom), 28-29 March 1972. London, Knight, 1972, p. 37-48.

This chapter outlines the contents of a human ecology course which has evolved from consideration of primarily plant and animal communities towards a broader view of the environment.

190. Ninan, V. *Environmental action by teacher trainees in West Africa*. Ondo (Nigeria), University of Ife, Adeyemi College, Institute of Education, n.d.

A brief report on the Youth Environment Programme for West Africa (YEPWA), an organization of teacher trainees concerned with the environment. YEPWA sponsors lectures, films, symposia, action programmes and projects, and interdisciplinary expeditions to environmentally important areas.

191. Ninan, V. *Environmental education through involvement of Youth Environment Programme for West Africa*. Ondo (Nigeria), University of Ife, Adeyemi College, Institute of Education, n.d.

A paper presented at the Science Association of Nigeria describing the purpose and aims of the Youth Environment Programme for West Africa. This programme will eventually include curriculum development projects on nine specific themes, including people, social organization, economics, aesthetics and ethics.

192. Odhiambo, T.R. The planning and teaching of science according to national needs. *Impact of science on society* (Paris, Unesco), vol. 23, no. 2, April/June 1973, p. 95.

This article examines the needs for science education in African countries.

193. Offutt, T.W. Students in a water testing program. *Science teacher* (Washington, DC), vol. 42, no. 2, February 1975, p. 45-7.

Describes a project in environmental education which gives high school teachers and students an opportunity to use scientific tools to investigate problems of community concern and to use social science as an instrument to effect change. This project in use in Ohio concentrates on water pollution control.

194. Organization for Economic Co-operation and Development (OECD). Centre for Educational Research and Development (CERI). *Environmental education at post-secondary level: courses for educators, decision makers and members of professions concerned with the environment*. Vol. 2. Paris, 1974. 184 p. [Also published in French.]

Case studies from OECD member countries deal with educators at primary, secondary and higher levels, with environmental decision makers and with professionals whose work links them to environmental questions, such as engineers, architects, etc. Each case study involves questions about course content, teachers, research base and instructional materials used in training.

195. OECD. CERI. *Environmental education at post-secondary level: the training of generalists and specialists*. Vol. 1. Paris, 1974. 208 p. [Also published in French.] (ED 092 403.)

This document contains a series of twelve case studies undertaken in various institutions of higher education in Australia, Canada, France, Sweden, the United Kingdom and the United States. These studies review recent experiments in the training of future environmental specialists and generalists. Information in each of the case studies is organized under the following headings: who does the teaching?; institutional organization; course content; teaching methods, media and materials; research base; criteria of success; and recurrent education.

196. OECD. CERI. *Environmental education at university level: trends and data*. Paris, 1973. 320 p. [Also published in French.]

The proceedings of a seminar organized in 1971 by CERI, the Centre d'Etudes Supérieures de l'Aménagement de l'Université de Tours and the French Government. Several case studies are presented relating to the level and type of environmental education at the university level in member countries. These studies come within CERI's project to develop environmental education through an interdisciplinary approach.

197. OECD. CERI. *Environmental problems and higher education*. Paris, 1976. 182 p. [Also published in French.]

198. OECD. Environmental education in the universities: a key to 'relevance'. *The OECD observer* (Paris), no. 68, February 1974, p. 27-30. [Also published in French.]

Based on the conclusions of the Tours symposium (see item 196), this article takes a look at initiatives in environmental education at the university level taking place in Canada, the United Kingdom and the United States.

199. Oswald, P. Environmental education and the conservationists. *Your environment* (Amersham, United Kingdom), vol. 2, no. 11, spring 1971, p. 20.

The historical development and relationship of conservationists and environmental education in the United Kingdom.

200. *Outdoor environmental education: an innovative and exemplary approach to pre-service and in-service teacher education*. Chadron State College, NE, 1972. 135 p. (ED 067 236.)

As portrayed in this programme, outdoor environmental education consists of: (a) an undergraduate course in outdoor education; (b) a sixth-grade outdoor education experience involving students in eleven local school systems; (c) a graduate summer workshop including an extended field trip; (d) field experiences for earth science students studying physiographic areas and excavating archaeological sites; (e) development of curriculum guidelines; (f) utilization of the state college field laboratory for outdoor, recreational and science activities; and (g) sponsorship of in-service training workshops for teachers. Additional material outlines objectives of the programme, personnel involved, budget requirements, evaluation procedures, programme impact—how it contributes to the improvement of teacher education—and future plans.

201. Paškang, K.V. *Prirodno – territorial'nye komplekсы i ih izučenie v kurse geografii srednej školy. Posobie dlja učitelej* [Natural territorial complexes and their study in the secondary school geography course]. Moskva, Prosveščenie, 1973. 160 p., illus.

202. Passmore, J. *Outdoor education in Canada—1972: an overview of current developments in outdoor education and environmental studies*. Toronto, Canadian Education Association, 1972. 72 p., illus., bibl. (ED 067 256.)

The study reviews trends and developments since a similar survey was undertaken in 1969. The first half of the report traces the beginnings of outdoor education programmes in Canada; defines outdoor education together with its objectives and values; evaluates the use of the mobile classroom—primarily the school bus; suggests opportunities for creativity for all grades in all subject areas; lists examples of what teachers are doing to enrich their programmes in numerous disciplines; advises where to start a programme and whom to contact for voluntary assistance; enumerates special problems encountered in teaching out of doors; and presents reactions from involved individuals—pupils, teachers, parents and administrators. The second half is a résumé of programmes, plans and problems in each of the provinces, followed by a sampling of special or unusual activities. Recommendations and final comments are accompanied by selected reference materials.

203. Pedley, F.H. Trend-setter: community development and the primary school. *Trends in education* (London), no. 33, May 1974, p. 41-2.

An example of how a primary school in the United Kingdom has reacted with the special needs of its community environment.

204. Peter, W.G. The American Institute of Biological Sciences joins others in search for interdisciplinary solutions to environmental problems. *BioScience* (Washington, DC), vol. 23, no. 7, July 1973, p. 448. (EJ 081 406.)

Describes results of efforts to seek meaningful ways of combining the knowledge and skill of different professions in alleviating environmental problems. An inter-society liaison committee on the environment was formed to implement the general philosophical goals of the American Institute of Biological Sciences.

205. Peterson, Carolyn M. The English teacher and the environment crisis. *English journal* (Urbana, IL), vol. 61, no. 1, January 1972, p. 120-4. (EJ 051 548.)

Practical suggestions about units and materials that the author has used in a high school environmental studies class.

206. *Podgotovka studentov pedagogičeskikh vuzov k kraevedčeskoi i prirodoohranitel'noj rabote s učaščimisja*. Tezisy dokladov k konferencii po problemam kraevedenija i ohrany okružajuščej sredy v rabote školy i pedvuza. [Preparation of students in higher teacher training establishments to organize the study of local lore, history and economy and for environmental education with schoolchildren.] Moskva, 1974. 152 p.

207. *Population workbook: a series of learning exercises in population studies for undergraduates*. Appleton, WI, Lawrence University, [1974]. 42 p. (ED 091 277.)

This series of population exercises for undergraduate use aims at bringing the student to the realization that he is a population actor and that his attitudes, values and behaviour are the raw material of population analysis. The exercises engage the student by personal involvement and by case-study approach in the use of demographic tools for analysis.

208. Porcher, L.; Ferran, P.; Blot, B. *Pédagogie de l'environnement*. Paris, Colin, 1975. 156 p. (Bourrelier-Education, 14.)

Defines the aims and objectives of environmental education and suggests methods such as individual activities and group projects. Discusses the environment and school architecture and suggests measures for teacher training.

209. Pratt, A.L. Cluster core curriculums for E.E.E. *Junior college journal* (Washington, DC), vol. 41, no. 4, December 1970/January 1971, p. 10-12. (EJ 029 614.)

The development of an interdisciplinary course in environmental and ecological education (E.E.E.), and the construction of guidelines for a central theme for environmental occupations education were the major objectives of more than sixty educators attending the Ecological Technician Education Workshop.

210. Project Canada West. *Canadian environmental concepts*. Edmonton, Western Curriculum Project on Canada Studies, 1971. 42 p. (ED 055 015.)

Describes a general high school interdisciplinary course on environmental studies. The course lasts from five to ten months and is outlined as follows: ecology, water pollution, air pollution, noise pollution, population, socio-economic implications and resource management. Course outlines, concepts and intended outcomes are described only for the first two units on ecology and water pollution. Students taking the course were expected: (a) to understand the changing role of man with respect to his ecosystem; (b) to understand better natural and unnatural environmental states; (c) to understand the effects of an excess or deficiency of materials to an ecosystem; (d) to develop an inquiring approach; (e) to recognize a need for the balance between economic and recreational needs; (f) to encourage positive attitudes; (g) to learn laboratory techniques; (h) to understand the effects of urbanization; and (i) to examine and develop their own systems of values. (See also item 32.)

211. Project Canada West. *Canadian urban dynamics: a model for student involvement in the urban setting*. Edmonton, Western Curriculum Project on Canada Studies, 1971. 31 p. (ED 055 017.)

This is a progress report on a project to develop an interdisciplinary secondary school curriculum on the Canadian urban environment. The primary goal is to encourage constructive involvement in urban life and community decision making, and to develop a personal and social competence that will engender a greater commitment to the city which is growing and changing.

212. Project Canada West. *Five to nine: urbanization and the social studies curriculum for the first four years (K-3) of Canadian schools*. Edmonton, Western Curriculum Project on Canada Studies, 1971. 60 p. (ED 055 018.)

The Powell River Project was designed by a team of primary school-teachers to develop a curriculum with the Canadian urban environment as a major focus. Activities and experiences were selected which lead the child to learn his role in society, to understand the relationship between groups, the interdependence of people and institutions, and how they are affected by urbanized environments. Students were also expected to develop a self-concept, self-esteem and a sense of individual responsibility.

213. Quigg, P.W., ed. *World directory of environmental education programs: post-secondary study and training in 70 countries*. New York, NY, Bowker, 1973. 289 p. (ED 089 990.)

This volume identifies and describes environmental education programmes offered in over 700 post-secondary institutions in seventy different countries. Much of the information was gained through a questionnaire sent to institutions of higher learning, training institutes and ministries. Besides the annotated listing of programmes by country, there are seven summarized listings as follows: field of emphasis; integrated degree programmes; specialized degree programmes; co-operative programmes; training programmes; short-term programmes; and miscellaneous programmes.

214. Qutub, M. *Program and abstracts of national symposium on methods of learning environmental science*. Chicago, IL, Mid-Continent Scientific, 1972. 45 p. (ED 070 611.)

Fifty-three abstracts of papers presented at the first National Symposium on Methods of Learning Environmental Science, held in Chicago, November 1972, are compiled in

this booklet. With the objective of exploring innovative ways of presenting environmental science at all levels, the symposium offered lectures and workshops for conference participants. Presentations are grouped into various levels and sections—elementary grades, environmental science projects for secondary school students, suggested activities for secondary school students, reports of research findings on projects conducted by high school students, and environmental science programmes at pre-college and college levels.

215. Ramsey, G.A. Environmental studies: what is it? *Lab-talk* (Victoria, Australia, Science Teachers' Association), vol. 15, no. 6, August 1971, p. 3-7.

The author proposes that environmental studies must include the development of scientific processes and attitudes, as well as the ability to make value judgements about environmental concerns. Three main areas for environmental study are suggested: (a) broad content themes; (b) student understanding of the problem; and (c) the role of institutions in an environmental studies programme. Content themes are listed as communication, measurement, energy, time, and natural order. The students should be able to understand themselves as part of the environment, as an individual, as a member of a group and as part of the man-made world. The role of social organizations in environmental studies is included.

216. Rappaport, D. Environmental mathematics. *School science and math* (Indiana, PA), vol. 70, no. 6, June 1970, p. 515-21. (EJ 024 065.)

217. Reid, D.J.; Booth, P. Independent learning in biology—results of trials, 1968-70. *The school science review* (London), vol. 52, no. 180, March 1971, p. 500-12.

How far can independent learning be extended at the expense of class-paced work? The conclusions of this report were: (a) independent learning has advantages over class-paced work in certain topics; in particular, the more able pupils work faster when learning at their own pace; (b) however, independent learning is not suitable for all topics. The best results are obtained by alternating the two methods. But neither of these methods, nor the development of computer-monitored instruction, is likely to lead to any diminution in the demand for skilled and qualified science teachers in the future.

218. *Report and proceedings of the natural resources and conservation education conference.* University of Zambia, Lusaka, 28-30 May 1970. Lusaka, Wildlife Conservation Society of Zambia, 1970.

An African conference on environmental education with some worldwide themes included such topics as: integrated science teaching; existing or planned programmes on natural resources and conservation education in Africa; programmes for teacher education and primary, secondary and adult education; report on the formulation of conservation principles; report on ways and means for environmental education; conservation activities in Zambia.

219. *A report of the state conference on environmental education.* Nashville, TN, Tennessee State Department of Education, 1972. 47 p. (ED 071 873.)

As part of an over-all plan for environmental education in Tennessee, this conference brought together ideas and information from public and private agencies, councils and organizations on the quality of the environment and environmental education. The participants sought to: (a) identify concerns about the environmental crisis; (b) explore existing projects and resources; (c) establish priorities, goals and objectives for environmental education; and (d) suggest mechanisms for implementing a state plan for environmental education. Their recommendations are summarized under

fourteen categories: state plan; legislation; leadership; co-ordination; communication; teacher education; community education; information exchange; survey of resources; in-service education; curriculum development; evaluation; environmental centres; and other areas. This document is, therefore, a compilation of pertinent and often conflicting comments and recommendations. It is not presented as a master plan for environmental education, rather its contents are to be utilized in the final preparation of the state plan by a special task force.

220. Riha, J. [Education for environmental protection.] *Nova mysl* (Ostrava, Czechoslovakia), vol. 28, no. 3, 1974, p. 496-8. [Original title and text in Czech.]

221. Riha, J. *Environmental education and co-operation of the member countries of the Council of Mutual Economic Assistance*. Prague, Technical University of Prague, 1974.

Report of a meeting of science researchers from Bulgaria, Czechoslovakia, German Democratic Republic, Poland, USSR and Yugoslavia. Concern was expressed by all about the promotion of education 'aimed at establishing the correct attitude by man towards his environment'. An effective system of education, both formal and non-formal, is necessary to bring together the theoretical basis and practical aspects of environmental education.

222. Riha, J. *University-level teaching and education on environmental issues in Czechoslovakia*. Prague, Technical University, 1974.

A description and rationale for post-graduate courses in human environmental education in Czechoslovakia.

223. Rogers, P.F. *Environmental education and the work of the Commonwealth Human Ecology Council*. Paper presented at the International Workshop on Environmental Studies in Higher Education and Teacher Training, London (Ontario), University of Western Ontario, 1972.

The role of the Commonwealth Human Ecology Council (CHEC) in environmental education is discussed. CHEC examines the problems of the human environment at the international level and seeks solutions through multidisciplinary means.

224. Rosich, R.S. *Environmental science: recent developments in tertiary education*. *Search* (Sydney), vol. 5, no. 9, September 1974, p. 429-32.

Describes educational programmes at the university level which have developed in Australia and elsewhere. Graduate programmes in the United States, the United Kingdom and Australia are described in general terms. The undergraduate programmes for Canberra College of Advanced Education are discussed in some detail.

225. Ross, J.E. *University organization for environmental education*. Paper presented at the first Annual Conference on Special Emerging Programs in Higher Education, St. Louis, MO, 17 October 1973. Madison, WI, University of Wisconsin, 1973. (ED 083 000.)

Are environmental concerns a viable and continuing basis for study in the university? Part of the problem has been the construction of a theme around which faculty and students could work. It is implied that the first task is to provide an organization of environmental studies which will provide a common theme for disparate disciplines. A model of substantive relationships is required. We have left behind the era when environmental issues meant recycling, and are now entering an era concerned with understanding the relationships of consumption patterns, with population and pollution, and whether or not technology is leading us in the direction we want to go. Other essentials for an environmental studies programme are: (a) some kind of status within the university hierarchy; (b) a definition of the teachers' freedom of manoeuvre; and (c) flexibility in the teaching format and the manner in which teachers prepare for interdisciplinary studies.

226. Roth, R.E. The environment and man. *Journal of environmental education* (Madison, WI), vol. 3, no. 3, spring 1972, p. 44-8. (EJ 060 019.)

A conceptual approach for environmental education from kindergarten through to grade 12 is advocated. The role of education in cognitive, affective and psychomotor development is defined, as well as the meaning of the term environmental management. Several new approaches are described which attempt to develop concepts appropriate to environmental education.

227. Roth, R.E. Fundamental concepts for environmental management education (K-13). *Journal of environmental education* (Madison, WI), vol. 1, no. 3, spring 1970, p. 65-74. (EJ 017 145.)

228. Roth, R.E. *International and national environmental education: a status report—1974*. Address delivered to the American Nature Study Society, San Francisco, CA, 26 February 1974. Columbus, OH, ERIC Information Analysis Center for Science, Mathematics and Environmental Education, 1974. 36 p. (ED 091 166.)

The current status of environmental education in the United States and in Australia, Canada, Czechoslovakia, Ecuador, the Federal Republic of Germany, Italy, Japan, Malta, the United Kingdom and Zambia.

229. Roth, R.E.; Helgeson, S.L. *A review of research related to environmental education*. Columbus, OH, ERIC Information Analysis Center for Science, Mathematics and Environmental Education, 1972. 56 p. (ED 068 359.)

To achieve the goals of environmental quality, new thrusts have been placed upon environmental education. The purpose of this report is: (a) to identify known research pertaining to environmental education; (b) to review critically the identified research; and (c) to identify further areas for research. The ninety-four studies selected include: (a) attempts at objective evaluation; and (b) works related to particular levels of education. The researchers addressed themselves to numerous aspects of environmental education, such as problems of philosophy, programme development, evaluation of instructional materials, selection of sites appropriate for learning, and outcomes of programmes. None of them, however, considered environmental education on a world-wide scale, which the reviewers consider should be the most effective approach.

230. Rudolph, J.H. A western regional approach. *Journal of environmental education* (Madison, WI), vol. 3, no. 2, winter 1971, p. 59. (EJ 054 293.)

An approach is suggested for co-operative, regional organization in order to co-ordinate environmental education development. A meeting of delegates from thirteen western states of the United States indicated levels of importance for conservation/environmental education, leadership, financial problems, and proposals for a co-operative project of information exchange and programme development.

231. Saveland, R.N., ed. *Handbook on environmental conservation education*. Athens, University of Georgia. [Draft publication under IUCN project 33-34.]

First draft for an international handbook on environmental education. Chapter titles include: curriculum design; method; facilities; youth involvement and community action; evaluation; and teacher education. Of particular use are the large number of international case studies which are included in each chapter to illustrate various topics. The emphasis is on education for kindergarten through to grade 12 and on teacher education.

232. Sawicki, M. Integracja wiedzy w nauczaniu przyrodoznawstwa [Integration of science in nature study]. *Nova szkoła* (Warszawa), vol. 19, no. 1, 1970, p. 19-21.

Reviews the approach to this problem with particular reference to western countries. Programmes in biochemistry, biophysics and physical chemistry are first examined

from the point of view of algebraic techniques, exercises in logic and new language forms, and a second part involves methods of integrating natural science disciplines.

233. Ščerbakov, M.I. Voprosy ohrany prirody v kurse osnov agrotehniki [Problems of nature protection in the foundation course in agricultural technology]. *Škola i proizvodstvo* (Moskva), no. 3, 1976, p. 49-54.

234. Schimmel, D. Un enseignement qui prépare l'avenir pour que survive le monde. *Informations universitaires et professionnelles internationales* (Paris), avril-mai 1974, p. 1-7. [English abstract.]

Examines education in the industrialized countries which is intended to promote individual and collective responsibility for new forms of world development. The discussion revolves around the themes of the development of education and future progress. The article sets out to explain why a study programme is necessary for the survival of this planet, what should be its objectives and what should be done about it at this moment.

235. Schoenfeld, C. Toward a national strategy for environmental education. *Journal of educational research* (Washington, DC), vol. 64, no. 1, September 1970, p. 5-11. (EJ 025 482.)

236. Schoenfeld, C. The university and environmental education. *Journal of environmental education* (Madison, WI), vol. 1, no. 4, summer 1970, p. 116-18. (EJ 022 595.)

237. Schoer, G. The integration of the sciences and implications for interdisciplinary studies and environmental education. *Science bulletin for teachers in secondary schools* (Sydney), no. 19, 1974.

The author examines the whole concept of secondary school integrated science. The rationale for such studies and current integrated curricula in the United Kingdom and the United States are discussed, and the difficulties examined. The present situation of integrated science teaching in Australia receives some attention.

238. Schools Council Project Environment. *Education for the environment*. London, Longmans, 1974. 76 p.

239. Science Education Programme for Africa. *A guide to the study of the environment*. Accra, SEPA, 1971.

240. Science Education Programme for Africa. *Learning of science and mathematics concepts for children in Africa*. Accra, SEPA, 1975.

241. Science Research Associates. *Youth power: an evaluation of the national youth conference on national beauty and conservation*. New York, NY, National Youth Conference, 1968.

242. Selmes, C., ed. *New movements in the study and teaching of biology*. London, Maurice Temple Smith, 1974. 343 p.

In the first section, seven specialists describe recent developments in their branches of biology—biochemistry, biophysics, developmental biology, and ecology. The relevance of recent discoveries to teaching in schools and colleges is discussed. In the second part, eight contributors write about new approaches and attitudes in teaching, mainly in schools. Independent learning, quantitative work, use of radioisotopes, attitude and motivation are some of the topics mentioned. In the final section, three writers consider some of the values and ideals which underlie the teaching and learning of biology.

243. Seminar on the training of teachers by the interdisciplinary system, to use this system in schools. *Final report*. Paris, Unesco, 1970. (ED/MD/12.)

Report of a conference sponsored by Unesco at Boua, Ivory Coast, in 1970. The conference was attended by teacher educators from primary teacher training colleges. Some of the topics from the conference are as follows: environment and environmental studies; how to conduct environmental studies; and environmental studies and teacher training.

244. Senesh, L. *Quality of life*. Boulder, CO, ERIC Clearinghouse for Social Studies/Social Science Education; Washington, DC, National Institute of Education, 1972. 64 p. (Interpretive series, no. 8.) (ED 076 467.)

Two government documents, 'Goals for Americans' and 'Towards balanced growth: quantity with quality', serve as the information source and basis for this guide. The first of these reports identified social priorities in terms of social problems, while the second focused on economic growth and its relationship to and impact upon the quality of life. The purpose of this present paper, which emphasizes the quality of life and economic growth, is to show how the two government reports may be used by educators as guidelines to introduce new ideas into the classroom—helping teachers to make the instruction of social sciences more relevant and helping students to develop a greater respect for the political processes of American society. Following an introduction which discusses the two government reports in some detail, the paper is arranged by seven topics: population growth and distribution; environment and balanced economic growth; education; basic natural science; technology assessment; consumerism; and economic choice and balanced growth. Under each topic a list is provided of classroom learning activities which encourage students to use the problem-solving approach toward dealing with social problems.

245. Shallard, P. *Environmental education: joint working party report*. Bedford (United Kingdom), County Education Office, 1972.

Presents current trends in school courses contributing to environmental education. Trends are presented for primary schools (ages 5-11), secondary schools (11-18) and colleges of education which train teachers. The appendixes include suggested courses of study for these three institutions.

246. Shannon, D.R. *Some thoughts on environmental education in England*. London, Department of Education and Science, 1975. 12 p.

A report of the 1975 European Architectural Heritage Year meeting held in Bath, United Kingdom. The emphasis is on ways of teachers of art, architecture, history, geography and environmental science working together to produce courses for all age levels.

247. Sharma, G.N. The role of the science teachers' association in the improvement of science education in Nigerian schools. *Journal of the science teachers' association of Nigeria*, vol. 12, no. 3, April 1974, p. 24-5.

An outline of objectives and activities proposed to meet national objectives.

248. Shomon, J.J. Nature centers: one approach to urban environmental education. *Journal of environmental education* (Madison, WI), vol. 1, no. 2, winter 1969, p. 56-60. (EJ 015 790.)

The development of nature centres, which will give an impetus to environmental education, is considered to be an urgent need.

249. Shushmanov, B. Recent program developments in the USSR and eastern European socialist countries. *Peabody journal of education* (Nashville, TN), vol. 51, no. 1, October 1973, p. 12-19. (EJ 088 813.)

This article considers that the developments in environmental education in the socialist

countries and the priority that is being shown to this area are very promising for future progress.

250. Sikes, W.N. *A study of the nature and effectiveness of the teaching of environmental problems to gifted science students in Texas public schools*. Austin, TX, University of Texas, 1972. 149 p. [Ph.D. dissertation.] (ED 084 147.)

Forty gifted pupils were identified by means of a contest; their science teachers and those professors who taught courses concerning environmental studies on the campus of the University of Texas were also included in the population under study. A checklist of environmental concerns was used to determine the concerns of the three groups. The results of the study indicated that environmental studies received little or no attention in the majority of science classes, particularly in physics and chemistry. Students scored higher on the test concerning environmental problems than on those related to the principles of science. Comparisons were made between method of environmental science instruction, size of school and geographical location. The students from the large schools scored significantly higher on the environmental problems examination. Comparison of the average rankings of the three groups on environmental problems, responsibility and influence as listed on the checklist of environmental concerns showed high degrees of correlation.

251. Škarban, N.V. *Prirodoohranitel'noe prosvešenie i škol'noe obrazovanie v zarubežnyh stranah (Zapadnoj Evropi)* [Environmental education and school education in foreign countries: Western Europe.] *Sovetskaja pedagogika* (Moskva), no. 12, 1973, p. 127-33.

With reference to material from national and international sources, the author describes the present position, the aims and objectives of environmental education in some Western European countries and then gives specific examples of educational programmes from Scandinavian countries.

252. Slastenina, E.S. *Vnimanie kursu ohrany prirody v pedagogičeskikh institutah* [Attention to nature conservation courses in pedagogical institutes]. *Vestnik vysšej školy* (Moskva), no. 11, 1973, p. 75-6.

The author states that the preparation of future teachers for environmental education in schools should be an important element in all teacher education programmes. At present there is a special thirty-two-hour course on nature conservation problems at all higher teacher training institutes. However, the author feels that the quality of these courses should be improved and makes some suggestions in this respect.

253. Smyth, J.C. *Thoughts on the planning of an environmental studies course*. Paper presented at the International Workshop on Environmental Studies in Higher Education and Teacher Training, University of Western Ontario, London (Canada). Morges (Switzerland), IUCN, 1972.

In discussing the place of environmental education in higher education, emphasis is placed on the whole environment and not just 'natural' environments.

254. Solid, M.L. *The use of a comparative analysis as an evaluation of a junior high school conservation education program*. Boulder, CO, University of Colorado, 1971. 157 p. [Ph.D. dissertation.] (ED 076 308.)

The study investigated differences in conservation attitudes between two communities where one community had a conservation education programme as part of its high school curriculum and the other did not. The study also sought to demonstrate a proposed model for curriculum evaluation. The comparative analysis indicated that a community with a conservation education programme in its junior high school exhibited more favourable attitudes towards natural resource conservation and knew more about conservation than did the other community. The conservation education programme was considered effective in promoting awareness of natural resource conservation and

in transferring knowledge about conservation to youth. A direct relationship between favourable attitudes towards conservation and knowledge about conservation was indicated.

255. Southwick, T.P. Westinghouse's environment school: combining business with ecology. *Science* (Washington, DC), vol. 169, no. 3944, July 1970, p. 453-4. (EJ 024 251.)

Describes the four-week Westinghouse School for Environmental Management, attended by executives from public and private power utilities. The school provided a comprehensive course in environmental problems with an emphasis on the relation of power production to the environment.

256. Stapp, W.B., et al. The concept of environmental education. *American biology teacher* (Washington, DC), vol. 32, no. 1, January 1970, p. 14-15. (EJ 014 436.)

Advocates a programme emphasizing interaction between man, culture and the biophysical environment, and social responsibility, in contrast to programmes which focus on natural resources. Outlines major objectives and attitudes.

257. Stapp, W.B. *Materials, ideas and questions to serve as a basis for preparing a position paper regarding the development and implementation of instructional programs in environmental education (K-12)*. Washington, DC, Office of Environmental Education, 1973. 37 p. (ED 076 421.)

A draft review of the philosophy, major constraints and strategy for curriculum development and implementation of an environmental education programme for kindergarten through to grade 12. Its purpose is to draw together some basic ideas and pertinent questions from leading educators, educational literature and successful environmental education programmes, in an effort to provide a focus and point of departure towards clarifying a comprehensive philosophy of environmental education and applying the resulting concepts to the development of educational programmes. Major emphasis is placed on strategy as a means of overcoming constraints. An eight-phase plan is offered. It involved reviewing the literature regarding the theories of learning and instruction; creating an environmental education committee to develop, implement and evaluate the programme and to facilitate communication; establishing goals and objectives, curriculum organization, and the curriculum or instructional model; encouraging a comprehensive in-service teacher education programme and developing an instrument to evaluate the effectiveness of the environmental education programme.

258. Stapp, W.B.; Visse, Ellen V. *Developing an environmental education program, K-12*. Lansing, MI, Michigan Environmental Education Association and Michigan Student Environmental Confederation, 1972. 20 p. (ED 071 867.)

A strategy for developing and implementing an environmental education programme for kindergarten through to grade 12 is proposed in this booklet. Its goal is to help students to become environmentally educated decision makers: to understand the importance of relating ecological, economic, social, technological and political information when working toward the solution of environmental problems. Nine steps in the sequential strategy are outlined and elaborated. These cover establishing an environmental education advisory committee, obtaining funds, hiring and formalizing responsibilities of a co-ordinator, defining programme goals, setting up operational objectives, determining strategy for curriculum development and implementation, providing an in-service teacher education programme, assisting schools in developing their school sites, and constructing measurement instruments to evaluate the effectiveness of the programme. Since the strategy is designed to be integrated into the existing curriculum, the environmental encounter and school site development approach are emphasized. The student is encouraged to be knowledgeable concerning the biophysical environment and associated problems, knowledgeable and skilful in solving these problems, and motivated to work toward their solution.

259. *A state plan for environmental education for the citizens of Minnesota*. St. Paul, MN, Minnesota Environmental Education Council, 1972. 43 p. (ED 080 341.)

A comprehensive plan for environmental education in Minnesota is defined including recommendations for an organizational structure consisting of eight regional environmental education commissions and one state co-ordinating council. The composition, duties, authority, boundaries and interdepartmental relationships are all enumerated for the commissions and the council. Recommendations for implementing environmental education programmes through formal and non-formal educational processes are also included. Methods and procedures are suggested for: kindergarten through to grade 12; non-disciplinary curricula; in-service teacher training; pre-service teacher training; higher education; non-formal community education; pre-school education; voluntary organizations; religious education programmes; business/industry/trade union organizations; and governmental units. In addition, an effective system of communication is described to be administered at the state level. Over-all, the plan has its foundations at the local and regional levels so that programmes can be implemented through the priorities and methods of the community. State governments are called upon to provide the organization and material resources which allow meaningful programmes to occur.

260. Stead, T.Y. An environmental studies centre. *Education news* (Woden, Australia), vol. 13, no. 12, December 1972, p. 4-8.

This article stresses the need for all pupils from kindergarten through to grade 12 to gain a better understanding of the environment through nature studies. The Environmental Studies Centre at Wirrimbirra Sanctuary is described; the study trails and field work available at the centre are reported as well as the manner in which these can be used by teachers and students. The basic purpose of the centre is the development of awareness, knowledge and commitment to the environment and resource management.

261. Stegner, R.W.; Arnsdorf, Val E. *A conceptual scheme for population-environment studies: experimental edition*. Newark, DE, Delaware University, Population Curriculum Study, 1972. 86 p. (ED 071 842.)

The kindergarten through to grade 12 comprehensive scheme for population-environment education was developed by the Population Curriculum Study to be utilized as a framework in which existing courses of study can continue to be used and in which new materials can be adopted. Its primary value is that it can serve as an inventory of teaching methods and materials and as a pattern in which faculty interrelationships can be identified. The scheme has been organized in two parts: first, a general development; and then a more detailed expansion to facilitate the assignment of responsibility for concept attainment among the teachers. It is recommended that the scheme could be used as a guide for a school-wide effort; it could also serve as a syllabus for an independent course in population-environmental studies.

262. Stegner, R.W.; Arnsdorf, Val E. *A conceptual scheme for population-environment studies: experimental edition revised*. Newark, DE, Delaware University, Population Curriculum Study, 1973. 75 p. (ED 092 334.)

(See previous item.) The development of the basic concept, 'Man is part of a natural system—the earth—and is ultimately subject to the limits of the system', depends partly on studies of the properties and interactions of water, air and the physical earth.

263. Steidle, W.E. The environmental education act. *Science and children* (Washington, DC), vol. 8, no. 6, March 1971, p. 21-2. (EJ 037 828.)

264. Steiner, R.L.; Barnhardt, R.B. The development of an instrument to assess environmental attitudes utilizing factor analytic techniques. *Science education* (New York, NY), vol. 56, no. 3, July-September 1972, p. 427-32. (EJ 065 794.)

Describes the techniques used to construct the 'Inventory of societal issues' and describes the seven scales which constitute the group. All scales reflect environmental issues related to science and technology.

265. Steinwachs, Barbara. *A selected list of urban and environmental gaming simulations*. Ann Arbor, MI, Michigan University, Environmental Simulation Laboratory, 1972. 266 p. (ED 067 228.)

This selection of four brief papers lists the names, pertinent information and sources of some fifty gaming simulations. Information on miscellaneous Environmental Simulation Laboratory publications, a history of the Laboratory, an appendix listing other games and sources, and a detailed description of the METRO-APEX game, including some suggested reference books for use during play of METRO-APEX, are also provided.

266. *Strand IV environmental and community health; ecology and epidemiology of health, grades 10, 11 and 12*. Albany, NY, State Education Department, Bureau of Secondary Curriculum Development, 1970. 59 p. (ED 077 723.)

A frame of reference concerning health implications based on the interaction of numerous factors in the physical, social and biological environments is provided in this prototype curriculum for grades 10-12. The development of sound techniques in problem solving is encouraged, resulting from the need to understand the nature and complexities of multiple effect and multiple causation. Specific curriculum content studies are as follows: (a) definitions of epidemiology and ecology; (b) epidemiological method; (c) factors which influence the occurrence, distribution, development, control and prevention of disease, disability, defect and death; and (d) modern public health problems with ecological implications. Appended material includes bibliographies of multi-media resources and a health behaviour model. This publication is one of a series of health curriculum materials devoted to environmental and community health (Strand IV). Four other strands deal with physical and mental health, sociological health problems, and education for survival. The format consists of four columns intended to provide teachers with: (a) a basic content outline; (b) major understandings and fundamental concepts; (c) teaching aids and learning activities; and (d) information about resource materials, sources and personnel. Because of the comprehensive nature of the total curriculum, teachers were advised to become familiar with all strands presently in print.

267. *Strand IV environmental and community health; environmental and public health, grades K-3*. Albany, NY, State Department of Education, Bureau of Elementary Curriculum Development, 1969. 47 p. (ED 077 725.)

An awareness of the environment and its relationship to human health and efficiency are the focal points of this prototype curriculum for pupils from kindergarten to grade 3. Assuming responsibility for creating and maintaining safe and healthy surroundings is urged. Specific curriculum content is as follows: (a) environmental factors (existing environment and effects, control, respect, appreciation and pollution of the environment); (b) responsibility for a healthy environment in the school, home and community; and (c) health professionals in the community. Appended material includes a chart indicating location of city, county, district and regional health department offices in New York state and bibliographies of multimedia resources for teachers and students. This publication is one in a series of health curriculum materials (see previous item).

268. Strom, A.A. School excursions, field studies and conservation education. *Science education news* (North Ryde, Australia), vol. 18, no. 1, May 1969, p. 23-8.

This article stresses the importance of field studies in environmental and conservation education. Problems associated with field excursions are discussed together with possible remedies. Some field studies are proposed, including the development of school natural areas and field study centres.

269. Sullivan, F.E. Jr.; Schlesinger, W.H. The environmental education act: where do we stand now? *BioScience* (Washington, DC), vol. 22, no. 6, June 1972, p. 361-3. (EJ 060 479.)

Summarizes the results of application of the Environmental Education Act, identifies weaknesses and suggests modifications to be made in the act when it is considered for renewal in 1973.

270. *A survey of environmental education programmes at universities and colleges in the Nordic countries.* Report of the Nordic Working Group for Environmental Education under the Nordic Committee of Senior Officials for Environmental Protection. København, Miljøministeriet Miljøstyrelsen, Dokumentation Saldellingeh, 1975. 89 p.

The topics are divided into survey courses, supplementary programmes and special programmes. The objectives of the course, the category of students for whom it is designed, the educational level, previous course work required, number of hours in the course and credit achieved are given for each of these interdisciplinary courses in Denmark, Finland, Norway and Sweden.

271. Sutman, F.X., ed. *What kind of environment will our children have?* Proceedings of the American Association of Colleges for Teachers Education/Organization of American States Conference on Education and the Environment in the Americas. Washington, DC, AACTE, 1970.

272. Swanson, J.E. *The effects of number of positive and negative instances, concept definition, and emphasis of relevant attributes on the attainment of three environmental concepts by sixth-grade children.* Madison, WI, Wisconsin University, Research and Development Center for Cognitive Learning, 1972. 164 p. (Technical report no. 244.) (ED 073 421.)

Three main studies were conducted to determine the effects of certain independent variables on the learning of environmental concepts. Sixth-grade children who participated in the experiments each read a series of three printed lessons and took four tests dealing with population, habitat and community. Five dependent measures were used to assess concept attainment: (a) recognition of new concept instances and non-instances; (b) overgeneralization; (c) undergeneralization; (d) recognition of the concept definition; and (e) knowledge of interrelationships among concepts. Results included: (a) presenting examples and non-examples in a rational teaching series promoted the correct classification of unencountered instances; (b) removal of negative instances from the rational teaching series resulted in significant overgeneralization; and (c) providing a concept definition with the rational series of three or four instances and three or four non-instances was not more effective in promoting concept learning than providing the rational series alone.

273. Swant, G.D. Environmental education in a rural setting. *American biology teacher* (Washington, DC), vol. 34, no. 9, December 1972, p. 518-19, 534. (EJ 069 577.)

Describes a multipurpose environmental education centre functioning in a rural setting. Besides the production of guidebooks, training teachers and other activities, the centre attempts to provide a model for environmental education on the national scale.

274. Taillieu, J. *La nature et nos enfants. L'enfant* (Bruxelles), n° 4, 1974, p. 285-91.

A synthesis of the ideas expressed in the work of J. Daubois which explains to parents and educators how to help children to live in harmony with nature.

275. Taller subregional de educación ambiental para educación secundaria, Chosica, Perú, 1976. *Informe final.* Lima, Dirección General de Educación Inicial y Básica Regular, Ministerio de Educación, 1976. 39 p. [Organized by Unesco in collaboration with the Ministries of Education of Cuba, Panama, Peru and Venezuela.]

276. Tanner, R.T. A demonstration environmental education program... the Rachel Carson project. *Nature study* (Salt Lake City, UT), vol. 26, no. 2, summer 1972, p. 6-7.

277. Tanner, R.T. Conceptual and instructional issues in environmental education today. *Journal of environmental education* (Madison, WI), vol. 5, no. 4, p. 48-53, 74.

278. Teaching environmental awareness. *Environmental science and technology* (Washington, DC), vol. 1, no. 1, January 1973, p. 18-19. (EJ 068 847.)

With a new director and new direction, the United States Department of Health, Education and Welfare's Office of Environmental Education is offering expertise and making grants to stimulate educational programmes. Resource materials are also being made available, successful programmes are transferred into other areas, and technical assistance is possible. Outstanding programmes are summarized.

279. Thompson, L. International environmental problems. *International educational and cultural exchange* (Washington, DC), vol. 7, no. 1, summer 1971, p. 61-6. (EJ 046 451.)

A small group of faculty members at the University of Colorado volunteered to organize an experimental interdisciplinary course which would attract students from many countries. This article relates how the course was planned and how the students evaluated the benefits they received. Twenty-five students from fifteen different countries were enrolled in this course.

280. Tinsley, I.J., et al. *Evaluation of an introductory college course in environmental studies: final report*. Corvallis, OR, Oregon State University, Department of Agricultural Chemistry, 1972. 63 p. (ED 067 280.)

This paper reports on an evaluation conducted at Oregon State University in 1971 and 1972 for an introductory college course in environmental studies: 'Man and the environment'. The course content was integrated and an interdisciplinary team of teachers used several innovative approaches. The students were administered tests entitled an Environmental Knowledge Inventory and an Inventory of Societal Issues (ISI), both before and after the course. Results indicated that students taking the course increased their knowledge of the environment significantly when compared with a control group; they also showed significant attitude changes for four of five factors on the ISI scale. These changes are interpreted to mean that the students have 'become less sure that scientific and technological advances are beneficial to the man-nature interaction, and they have become more aware of the complexity of the problems; they are more concerned with the problems of population growth and the need to restrict it; they are less certain that science and technology are capable of solving society's problems; and they are more concerned with individual and personal responsibility and action.

281. Title III in environmental education. *Title III quarterly* (Washington, DC, National Advisory Council on Supplementary Centers and Services), spring 1972. [Special issue.] (ED 068 274.)

Contributions derived from the funds of the Elementary and Secondary Education Act Title III and directed towards new thrusts in environmental education are portrayed in this quarterly journal. These funds have provided opportunities for development of innovative model environmental education programmes in many local school districts. Responding to new educational needs, the projects have sought to frame new objectives, goals, attitudinal changes, lesson plans, teaching materials and evaluation instruments. Résumés of selected projects may serve as sources of information to school administrators who are thinking of adding environmental education programmes, and to teachers who are seeking ways to give their students environmental experiences. Model projects reviewed include a community programme in environmental education, a regional approach to environmental education and a statewide strategy for environmental education. Brief descriptions are given of four projects citing ways and means of implementing environmental philosophies and objectives, and fifteen projects addressing problems common to many programmes and states. Statements from four environmental leaders on 'Why environmental education?' conclude the document.

282. *Total environment education: an open design to real life learning experiences*. Indianapolis, IN, State Department of Public Instruction, 1972. 122 p. [Draft edition.] (ED 071 868.)

Six global objectives—energy, earth resources, waste disposal, population, interdepen-

dence, and quality of life—are used as a framework in preparing this open design for environmental education, one which emphasizes behavioural change. To aid teachers to achieve these goals, the guide is divided into five sections. Part 1 deals with the role of the teacher in the classroom situation and covers teaching strategies which recognize environmental education as future oriented, problem focused, interdisciplinary, student initiated and community centred. In Part 2 each global objective is stated with specific teaching objectives, and with suggestions for a suitable grade level and subject area. Part 3 develops several model units for the kindergarten through to grade 12 which incorporate instructional objectives, possible student activities and teaching aids. Suggestions for implementation of an on-going environmental education programme in terms of what can be done in the local district are provided in Part 4. The final section gives names and addresses of agencies and individuals who can provide free and inexpensive materials to supplement the environmental education programme.

283. Trent, J. Status of environmental science in colleges of education. *Journal of environmental education* (Madison, WI), vol. 3, no. 4, summer 1972, p. 53. (EJ 061 009.)

Reports the first national survey to determine current status of environmental science in teacher education colleges. Data shows that environmental science is often being taught but methods of teaching the subject are not.

284. Trohanis, P. Environmental ecological education via simultaneously projected multiple-images with sound. *Audiovisual instruction* (Washington, DC), vol. 16, no. 1, January 1971, p. 19-26. (EJ 032 175.)

285. *Undergraduate education in the sciences for students in agriculture and natural resources*. Summary of proceedings of regional conferences. Washington, DC, Commission on Education in Agriculture and Natural Resources; National Academy of Sciences, 1971. 174 p. (ED 073 933.)

Following a national conference on this theme, four regional conferences took place bringing together teaching faculty members from agriculture, forestry and other natural resources areas, and from biology. This summary report presents papers from these regional meetings. Two general objectives for the regional conferences were recognized: (a) to acquaint the instructional staffs in agriculture and natural resources with the changes that are taking place in their areas of concern and with the opinions of various study groups as to the education of their students over the next few decades; and (b) to inform biologists of the needs of students in agriculture and natural resources for the needs of curricula planning. The chapter titles for similar topics are as follows: (a) trends in agricultural curricula; (b) trends in renewable natural resources curricula; (c) trends in biology curricula; (d) physical sciences and mathematics; (e) social sciences; (f) the junior college; (g) industry's view; and (h) summary statements. Appended material is devoted to discussion group summaries, various curricula, recommendations and participants.

286. Unesco. *Conservation of natural areas and the genetic material they contain: progress report on project 8*. Report of the International Co-ordinating Council of the Programme on Man and the Biosphere, fourth session, Paris 1975. Paris, 1975. 5 p. (MAB/ICC.4/13;SC.75/CONF.218/COL.12.) [Also published in French, Russian and Spanish.]

A meeting report dealing with the 'Man and the biosphere' programme and its research project on the conservation of nature, with particular reference to the development of an international network of natural reserves to study the biosphere, natural ecosystems and natural biomes.

287. Unesco. *Expert panel on educational activities under the man and the biosphere programme, Paris, 1972. Final report*. Paris, 1973. 54 p. (MAB report series, no. 7.) [Also published in French.]

A meeting report outlining activities in environmental education to be promoted under the MAB programme; refers to post-graduate courses, seminars and interdisciplinary

research, as well as to publications on the biosphere. Also refers to relations with other international organizations.

288. Unesco. *New trends in integrated science teaching*. Vol. 2. Paris, 1973. 239 p.

The second of three volumes which contains a collection of nine chapters each summarizing the present position in various aspects on integrated science teaching: (a) aims and objectives; (b) rationale; (c) content and approaches at primary and secondary levels; (d) teaching methods at primary and secondary levels; (e) tertiary education; (f) low-cost apparatus; (g) environmental education; (h) evaluation; and (i) integrated science as part of general education.

289. Unesco. *Report on the work of the United Nations conference on the human environment and its implications for Unesco*. Paris, 1972. 18 p. (ED 077 675.)

Activities, programmes and recommendations emanating from the United Nations Conference on the Human Environment are reviewed in this report in the light of their relationship with Unesco. Only those highlights of the conference which are relevant to Unesco's programme are given in this document. These topics include: the 'Man and the biosphere' programme; the International Hydrological Decade; oceanography; natural disasters; social sciences; protection of the world cultural and natural heritage; education and training; public information; and scientific and technical information. Unesco has conducted many activities in the environmental field but most of them have been concentrated in the science sector. Thus, it was concluded, a major effort should be made in the direction of interdisciplinary action with the co-operation of other sectors—physical, biological, social, educational and cultural.

290. Unesco. *Teaching materials on population, international understanding and environmental education*. Prepared by the Commission on Geography in Education of the International Geographical Union on the basis of plans formulated at the Unesco/IGU Regional Workshop on the Teaching of Geography held in Sydney, Australia, September 1973. Paris, 1975. 158 p., illus.

This text results from the collaborative effort of fifteen expert geographers in South East Asia and Oceania. It is intended for primary and secondary school-teachers and teacher-training institutions in the field of geography and social studies. At the same time it should be of value to curriculum planners and authors of textbooks. The material consists of eleven teaching units with some eighty illustrations. Each unit is designed and developed in sequence to cover up to ten class periods of teaching learning.

291. *United Nations conference on the human environment*. New York, NY, United Nations General Assembly, 1972. 684 p. (ED 080 288.)

Includes several reports emanating from the conference: (a) provisional agenda; (b) annotations to the provisional agenda; (c) provisional rules of procedure; (d) draft declaration on the human environment; (e) planning and management of human settlements for environmental quality (subject area 1); (f) environmental aspects of natural resources management (subject area 2); (g) identification of pollutants of broad international significance (subject area 3); (h) draft articles of a convention on ocean dumping; (i) educational, informational, social and cultural aspects of environmental issues (subject area 4); (j) development and the environment (subject area 5); (k) international organizational implications of action proposals (subject area 6); (l) views of the preparatory committee for the conference (on subject area 6); (m) the United Nations System and the human environment; (n) conference bibliography; (o) information on conference documents; (p) recommendations for action; and (q) a list of abbreviations used in the official conference documents.

292. United Nations Conference on the Human Environment, Stockholm, 1972. *Environment*. Geneva, United Nations Centre for Economic and Social Information, 1972. 23 p. (ED 070 589.)

Highlights of the United Nations conference including resolutions, reports, statements and speeches.

293. United Nations Development Programme. *Beyond conflict or compromise: human progress, environmental protection and the United Nations Development Programme*. New York, NY, UNDP, [1973]. 39 p.

294. United States Advisory Council on Environmental Education. *Second annual report*. Washington, DC, Office of Environmental Education, 1973. 20 p. (ED 073 950.)

Established to advise and assist in the implementation of the Environmental Education Act of 1970, the Advisory Council on Environmental Education has summarized its activities for 1972 in this annual report. The council indicated that it was severely handicapped by lack of adequate funding, and lack of staff. Following this, the council's detailed findings and recommendations are as follows: (a) extension of the Environmental Education Act; (b) possible relocation of the Office of Environmental Education; (c) evaluation of the environmental education grants programme; (d) creation of an inter-agency co-ordination committee for environmental education; (e) restructuring the Advisory Council on Environmental Education; and (f) full staffing for the Office of Environmental Education. Appended materials include the text of the Environmental Education Act of 1970, funding for the years 1971-73, a summary of grants provided in 1972, and a schedule of activities to date.

295. United States Office of Education. *Environmental education projects: fiscal year 1972*. Washington, DC, Office of Environmental Education, 1972. 34 p. (Report no. DHEW-OE-73-15000.) (ED 081 594.)

296. United States Office of Education. *Environmental education projects: fiscal year 1973*. Washington, DC, Office of Environmental Education, 1973. 20 p. (ED 079 116.)

297. United States Office of Education. *Office of Education grants for environmental education, 1972*. Columbus, OH, ERIC Information Analysis Center for Science, Mathematics and Environmental Education; Washington, DC, Office of Environmental Education, 1972. 21 p. (ED 070 601.)

Summarized in this pamphlet are the Office of Education grants for 1972 in the field of environmental education. Tables indicate awards by region and state, categories (workshops; statewide evaluation and dissemination; pilot projects), comparisons with 1971 awards, and types of organization funded. Each project is listed individually, giving its complete title, name of director, name of organization and address.

298. Update on the report of the NEA task force on environmental education. *Today's education* (Washington, DC), vol. 60, no. 6, September 1971, p. 33-48. (EJ 042 141.)

A report of the activities of the National Educational Association and the Association of Classroom Teachers.

299. Valenzuela, M. Ecología y educación. *Cuadernos de educación* (Santiago), no. 32, diciembre 1973, p. 11-15.

300. Voelker, A.M. *Environmental education in the elementary school: needs and specification*. Madison, WI, University of Wisconsin, Research and Development Center for Cognitive Learning, 1970. 37 p. (Working paper no. 40.) (ED 080 287.)

A description of needs and specifications for research and development activities in elementary school science are presented in this paper. Serving as a report from the

project on Prototype Instructional Systems in Elementary Science, it considers the current and future needs of the child and the society of which he is a member. An overview of current deficiencies is given, followed by a plan for development and research activities which will provide an environmental education for elementary schoolchildren. The strengths and weaknesses for several alternatives for developing environmental education materials are indicated. Throughout the report, the necessity of co-operative arrangements among school personnel, universities, government agencies and private industry is indicated.

301. Voelker, A.M., ed. *Environmental education: planning priorities*. Proceedings of the Environmental Education Workshop for Teachers and Teacher Trainers, Madison, WI, May 1971. Madison, WI, University of Wisconsin, 1971. 186 p. (ED 081 592.)

Using the premise that one of society's most pressing educational needs is the preparation of personnel to implement and facilitate environmental education programmes in schools, teacher preparation institutions and other educational agencies, the conference focused on 'what to do' and 'how to do it'. Speakers discussed problems to be encountered in developing and maintaining environmental education programmes, as well as how to design approaches for alleviating these problems. Content is divided into five areas: (a) developing master plans for environmental education (planning guidelines, federal planning and co-ordination, etc.); (b) dimensions of environmental education programmes (curriculum organization, environmental influences on human behaviour, human values, and education as environment); (c) resources for environmental education (allocating resources, environmental management education, and the environmental science centre); (d) community environmental education (community interaction, environmental education for the total community, the business community, and a school and some volunteer organizations); and (e) the workshop in retrospect—a summary (planning the programme, guidelines for curriculum development, future directions, and community environmental education).

302. Vredfeld, Ruth; Martin, R. Recycling solid waste in Chattanooga. *American biology teacher* (Washington, DC), vol. 35, no. 2, February 1973, p. 84-7. (EJ 072 969.)

Students undertook a group project in collaboration with city officials to study types of community waste and the possibility of recycling solid wastes. Data collected from various sources revealed that the public attitude was favourable towards recycling efforts and that it was feasible economically.

303. Wals, H. *Northwest European training course for teachers of environmental education methodology, Wilhelminaard, Netherlands, 11-21 July 1972*. The Hague, School and Children's Garden Service, [1972].

A report on an international course for teachers for all levels from pre-school education to the university level.

304. Warpinski, R. *A supplementary program for environmental education, art, grade K-3*. Green Bay, WI, Project Instruction-Curriculum-Environment, 1972. 76 p. (ED 079 147.)

Presented in this teacher's guide for kindergarten through to grade 3 are lesson plans and ideas for integrating art and environmental education. Each lesson originates with a fundamental concept pertaining to the environment and states, in addition, its discipline area, subject area and problem orientation. Then behavioural objectives and learning experiences are outlined. Space is provided for teachers to note resource and reference materials—publications, audio-visual aids, and community resources. The guides are designed to supplement existing course content at appropriate times.

305. Warpinski, R. *A supplementary program for environmental education, art, grade 10-12*. Green Bay, WI, Project Instruction-Curriculum-Environment, 1972. 88 p. (ED 079 150.)

Presented in this teacher's guide for grades 10-12 are lesson plans and ideas for integrating art (drawing, painting, graphics, photography and commercial art) and environmental

education. Each lesson is based on a fundamental concept relating to the environment and is accompanied by an explanation of its discipline area, subject area and problem orientation. Behavioural objectives and suggested learning experiences are outlined. (See also previous item.)

306. Warpinski, R. *A supplementary program for environmental education, industrial arts, grade 7-12*. Green Bay, WI, Project Instruction-Curriculum-Environment, 1972. 76 p. (ED 079 153.)

Presented in this teacher's guide for grades 7-12 are lesson plans and ideas for integrating industrial arts (draughtsmanship, woodworking and metalworking) and environmental education. (See previous items.)

307. Weidner, E.W. The University of Wisconsin - Green Bay: man and his environment. In: Niblett, R.W.; Butts, R.F., eds. *World year book of education, 1972/73*. London, Evans, 1972, p. 243-54. [Special issue: universities facing the future.]

Description of environmental education at the University of Wisconsin-Green Bay, where the emphasis is on values, self and society; environmental problems; and education through experience.

308. Wheatley, J.H.; Coon, H.L., eds. *100 teaching activities in environmental education*. Columbus, OH, ERIC Information Analysis Center for Science, Mathematics and Environmental Education, 1974. 204 p. (ED 091 172.)

This package contains over one-hundred activities in environmental education designed for students from the kindergarten through to grade 12. Each activity has been classified by the editors according to the most appropriate grade level, subject matter, environmental concept involved and environmental concept area. Subject areas are science, mathematics, social studies, language arts and fine arts; environmental concepts include bio-physical, socio-cultural, management and change; and problem areas are aesthetics, health, genetics and physiological/behavioural. In addition to being classified into these four categories, each activity contains: (a) a statement of purpose on how the activity may be used; and (b) a reference to a source where the activity may be found in more detail or with variations.

309. Wiener, M. Review of research: philosophy and goals for outdoor education by Clinton N. Fitzpatrick. *Journal of outdoor education* (Oregon, IL), vol. 4, no. 2, winter 1970, p. 17-21. (EJ 015 656.)

Morris Wiener's review of an unpublished doctoral dissertation.

310. Wilton, Patricia J. A comparison between teaching methods in secondary biology. *Journal of biological education* (New York, NY), vol. 5, 1971, p. 179-85.

This article compares the effectiveness of a section taken from a published programmed-learning test in biology with that of a more conventional lesson conducted in three secondary schools in London. No differences were found.

311. Wipper, K., et al. *Outdoor education 'without boundaries'*. Proceedings of an international conference in Dorset, Ontario, 28 September - 1 October 1972. Council of Outdoor Educators of Ontario, 1973. 224 p.

The papers presented at this conference included topics such as: outdoor education for the handicapped; the role of government; curriculum development; teacher education; and environmental education.

312. Wise, R.C. *Outdoor versus indoor learning in elementary school science*. University Park, PA, Pennsylvania State University, 1970. 154 p. [Ed.D. dissertation.] (ED 075 167.)

The purpose of this study was to assess and compare achievement of students who were taught science by three different approaches—direct experience, outdoor class-

room and indoor classroom. In addition, the number of students making observations of the outdoor environment for each group was analysed. The specific problems investigated were as follows: (a) do students acquire more science knowledge, more comprehension and greater retention when taught by the direct experience approach than when taught by the outdoor or indoor classroom approaches?; (b) do more students make observations of the outdoor environment when taught by the direct experience approach than when taught by the other two approaches? Following testing and analysis of data, it was concluded that gains were not significant among the three treatments.

313. Withrington, D., ed. *Youth and environment*. Amsterdam, International Youth Federation for Environmental Studies and Conservation, 1972.

314. Wolsk, D. *An experience-centred curriculum: exercises in perception, communication and action*. Paris, Unesco, 1975. 52 p. (Educational studies and documents, 17) [Also published in French and Spanish.]

This study describes a Unesco-sponsored experimental project designed to develop and apply a new approach to education for international understanding. Aimed at pupils 11 to 18 years old, the project is based not on textbooks or lessons but on the pupil's own behaviour in the various experience situations set up by the teacher. The exercises outlined were planned and tested by teachers from Unesco Associated Schools in eight countries; they include role-playing activities, experiments in perception, communication and group behaviour, questionnaire studies and action projects within the school and community, simulations and 'fantasy scenarios'.

315. Working Meeting of the IUCN Commission on Education, Dehra Dun, India, 21-22 November 1969. *Environmental conservation education problems in India*. Morges (Switzerland), International Union for the Conservation of Nature, 1970. 74 p. (IUCN publication new series. Supplementary paper no. 25.)

316. World environment: resources group formed. *Chemical and engineering news* (Washington, DC), vol. 51, no. 40, October 1973, p. 21. (EJ 086 740.)

317. Wurzelbacher, Thelma. Putting environmental education on the road. *American biology teacher* (Washington, DC), vol. 35, no. 6, September 1973, p. 341-3, 348. (EJ 083 348.)

Describes a programme in environmental education in which secondary school students and teachers made a concentrated study of the north-eastern region of the United States on a one month camping trip. Details of the budget, suggested personal equipment and group camping equipment are provided.

318. Zahlebnij, A.N. O sisteme prirodoohranitel'nogo prosveščenija v obščebrazovatel'noj škole. [On the system of environmental education in the general school]. *Sovetskaja pedagogika* (Moskva), no. 10, 1972, p. 57-66.

The author gives in the first part a brief outline of the state of nature protection at the international level and its development trends. The second part deals with environmental education in the general school. The author points out that since the early sixties laws on the safeguarding of nature have been adopted throughout the Soviet Union, and the schools have complied by introducing the protection of all basic natural resources into the programmes and textbooks of such subjects as biology, chemistry, geography, etc. The conclusion draws attention to the necessity of building up and developing a system of environmental education in the general school and presents what are considered to be main directions of educational research in this area.

319. Zverev, I.D. O formirovanii otvetstvennogo otnošenija učaščihsja k prirode v sisteme kommunističeskogo vospitanija [The system of communist education and the formation in children with a responsible attitude toward nature]. *Sovetskaja pedagogika* (Moskva), no. 11, 1973, p. 21-30.

320. Zverev, I.D.; Zahlebnij, A.N. Teoretičeskie osnovy prirodoohranitel'nogo prosvěšćenija v škole [Theoretical basis of nature conservation taught in schools]. *Sovetskaja pedagogika* (Moskva), no. 12, 1973, p. 31-9.

This article deals with the necessity of teaching the young an awareness of nature, the relationship between man and nature, the moral and aesthetic influence of nature upon man, and man's activities for the protection of nature.

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